



DUDLEY KNOX LIBRARY  
NAVAL POSTGRADUATE SCHOOL  
MONTEREY CA 93943-5101









# NAVAL POSTGRADUATE SCHOOL

## Monterey, California



# THESIS

COSTS OF OPERATION DESERT SHIELD/DESERT STORM:  
A BURDEN SHARING PERSPECTIVE

by

Brian E. Hinkley

December, 1991

Thesis Co-Advisors:

William R. Gates  
Katsuaki L. Terasawa

Approved for public release; distribution is unlimited



## REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S)		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION Naval Postgraduate School	6b. OFFICE SYMBOL <i>(If applicable)</i> 36	7a. NAME OF MONITORING ORGANIZATION Naval Postgraduate School	
6c. ADDRESS (City, State, and ZIP Code) Monterey, CA 93943-5000		7b. ADDRESS (City, State, and ZIP Code) Monterey, CA 93943-5000	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION	8b. OFFICE SYMBOL <i>(If applicable)</i>	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER	
8c. ADDRESS (City, State, and ZIP Code)		10. SOURCE OF FUNDING NUMBERS	
		Program Element No	Project No
11. TITLE ( <i>Include Security Classification</i> ) COSTS OF OPERATION DESERT SHIELD/DESERT STORM: A BURDEN SHARING PERSPECTIVE			
12. PERSONAL AUTHOR(S) Hinkley, Brian E.			
13a. TYPE OF REPORT Master's Thesis	13b. TIME COVERED From                  To	14. DATE OF REPORT (year, month, day) December 1991	15. PAGE COUNT 111
16. SUPPLEMENTARY NOTATION The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.			
17. COSATI CODES		18. SUBJECT TERMS ( <i>continue on reverse if necessary and identify by block number</i> ) Burden Sharing, Operation Desert Shield/Desert Storm, Oil supply security benefit, Proxy, Disproportionality, Equity, Incremental costs	
19. ABSTRACT ( <i>continue on reverse if necessary and identify by block number</i> ) This thesis analyzes burden sharing issues of Operation Desert Shield/Desert Storm. Explanations of economic principles including public goods theory, disproportionality, free riding, marginalism, and opportunity cost provide a common base of knowledge necessary for an intelligent discussion of burden sharing in defense alliances. The thesis concentrates on the problems associated with quantifying benefits, costs and equity issues in multilateral force actions like Operation Desert Shield/Desert Storm. In particular, it analyzes the Persian Gulf oil supply security benefit and evaluates the efficacy of various oil benefit measures. Current cost estimates and cost reports focus on legitimizing supplemental funding. They do not capture all of the incremental costs appropriate for burden sharing. This thesis examines the critical differences between incremental burden sharing costs and the costs that were reported to satisfy congressional budget deliberation. Recommendations focus on ways for the U.S. to implement the financial lessons learned from Operation Desert Shield/Desert Storm to be more prepared for similar burden sharing arrangements in the future.			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS REPORT <input type="checkbox"/> DTIC USERS		21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a. NAME OF RESPONSIBLE INDIVIDUAL K.L. Terasawa and W.R. Gates		22b. TELEPHONE ( <i>Include Area code</i> ) (408) 646-2463/2754	22c. OFFICE SYMBOL AS/Tk AS/Gt

Approved for public release; distribution is unlimited.

Costs of Operation Desert Shield/Desert Storm:  
A Burden Sharing Perspective

by

Brian E. Hinkley  
Lieutenant, United States Navy  
B.S., United States Naval Academy, 1983

Submitted in partial fulfillment  
of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL  
December 1991

## **ABSTRACT**

This thesis analyzes burden sharing issues of Operation Desert Shield/Desert Storm. Explanations of economic principles including public goods theory, disproportionality, free riding, marginalism, and opportunity cost provide a common base of knowledge necessary for an intelligent discussion of burden sharing in defense alliances.

The thesis concentrates on the problems associated with quantifying benefits, costs and equity issues in multilateral force actions like Operation Desert Shield/Desert Storm. In particular, it analyzes the Persian Gulf oil supply security benefit and evaluates the efficacy of various oil benefit measures.

Current cost estimates and cost reports focus on legitimizing supplemental funding. They do not capture all of the incremental costs appropriate for burden sharing. This thesis examines the critical differences between incremental burden sharing costs and the costs that were reported to satisfy congressional budget deliberation.

Recommendations focus on ways for the U.S. to implement the financial lessons learned from Operation Desert Shield/Desert Storm to be more prepared for similar burden sharing arrangements in the future.

**TABLE OF CONTENTS**

I.	INTRODUCTION . . . . .	1
A.	BACKGROUND . . . . .	1
B.	OBJECTIVES . . . . .	2
C.	RESEARCH QUESTIONS . . . . .	3
D.	SCOPE . . . . .	4
E.	ASSUMPTIONS . . . . .	5
F.	METHODOLOGY . . . . .	6
G.	ORGANIZATION OF STUDY . . . . .	7
II.	UNDERLYING ECONOMIC CONCEPTS . . . . .	8
A.	GENERAL . . . . .	8
B.	EFFICIENCY AND EQUITY . . . . .	8
C.	PUBLIC GOODS . . . . .	9
D.	FREE RIDING . . . . .	10
E.	OPPORTUNITY COST AND MARGINALISM . . . . .	11
F.	DISPROPORTIONALITY: THE PRIMARY BURDEN SHARING COMPLAINT . . . . .	12
1.	Measuring Costs and Benefits . . . . .	12
a.	Quantifiable Proxies . . . . .	13
(1)	Input Measures. . . . .	13
(2)	Output Measures. . . . .	14
(3)	Shortcomings. . . . .	15

b. Measuring Disproportionality Is Impossible . . . . .	16
III. THE BENEFITS OF OPERATION DESERT SHIELD/DESERT STORM . . . . .	19
A. NATIONAL SOVEREIGNTY . . . . .	19
B. REGIONAL AND INTERNATIONAL STABILITY . . . . .	21
C. OIL SUPPLY SECURITY . . . . .	23
IV. CONTRIBUTIONS OF OPERATION DESERT SHIELD/DESERT STORM . . . . .	34
A. ALLIED CONTRIBUTIONS . . . . .	34
1. Military Forces . . . . .	35
2. Financial Contributions . . . . .	36
3. Host Nation Support . . . . .	36
4. In-Kind Assistance . . . . .	38
5. Economic Aid . . . . .	41
6. Other Support . . . . .	43
B. COLLECTING ON ALLIED PLEDGES . . . . .	45
V. U.S. CONTRIBUTIONS TO THE OPERATION . . . . .	48
A. INADEQUATE GUIDANCE LEADING TO CONFUSION BETWEEN COST ESTIMATE PURPOSES . . . . .	48
B. DIFFICULTIES IN ESTIMATING U.S. COSTS . . . . .	57
1. Quantifiable Costs . . . . .	57
2. Offsets . . . . .	63

3. Non-Quantifiable Costs . . . . .	64
VI. CONCLUSIONS AND RECOMMENDATIONS . . . . . 66	
A. CONCLUSIONS . . . . .	66
1. Understanding Economic Concepts Is Critical . . . . .	66
2. Measuring Equity Is Difficult . . . . .	67
a. Appropriate Use Of Proxies Is Imperative . . . . .	67
b. Equity Formulas Are Not Necessary . . . . .	67
3. Burden Sharing Incremental Costs Are More Inclusive . . . . .	69
B. RECOMMENDATIONS . . . . .	69
1. Realize the Uniqueness of the Operation . . . . .	69
2. Stress An Equitable Process . . . . .	72
3. Remember The Lessons Learned From The Operation . . . . .	73
4. Respond To The Changing Threat . . . . .	74
5. Conserve Energy . . . . .	76
C. SUMMARY . . . . .	77
APPENDIX A, OMB MONTHLY COST REPORT . . . . .	79
APPENDIX B, IN-KIND ASSISTANCE . . . . .	98
APPENDIX C, FINANCED AVIATION LINE ITEMS . . . . .	99
LIST OF REFERENCES . . . . .	100
INITIAL DISTRIBUTION LIST . . . . .	102

## LIST OF FIGURES

Figure 1.	U.S. Senate's View: Gulf Oil Dependence vs Personnel Contributed . . . . .	25
Figure 2.	Simulation of Oil Price Increase on GNP . .	27
Figure 3.	IMF Study of 50% Price Increase on GNP . .	28
Figure 4.	Effects on the Long-Run Price of Oil . . .	31
Figure 5.	World Oil Production Recovery . . . . .	33
Figure 6.	Allied Cash and In-Kind Contributions . . .	37
Figure 7.	Coalition Net Contributions . . . . .	39
Figure 8.	Summary of Economic Assistance . . . . .	42
Figure 9.	Cash, In-Kind, and Economic Assistance by Dollar Amount . . . . .	44
Figure 10.	Member's Assistance as a Percentage of Total Coalition Assistance . . . . .	45
Figure 11.	Fulfillment of Pledge Commitments . . . .	47
Figure 12.	Clarification of Cost Categories . . . . .	53
Figure 13.	Increased Costs From Smaller Force Reductions . . . . .	60

**LIST OF APPENDICES**

APPENDIX A, OMB MONTHLY COST REPORT, SEPTEMBER 16, 1991 .	79
APPENDIX B, IN-KIND ASSISTANCE . . . . .	98
APPENDIX C, FINANCED AVIATION LINE ITEMS . . . . .	99

## I. INTRODUCTION

### A. BACKGROUND

Operation Desert Shield/Desert Storm has established a new level of allied cooperation, including significant financial burden sharing by an unprecedented number of countries. The Administration and the Department of Defense (DoD) have both stated that emphasis should be focused on our capability to respond to more of these regional conflicts in the future. This emphasis was confirmed by President Bush during his August 2, 1990 "new strategy" speech in Aspen, Colorado. It was also confirmed by the Secretary of Defense (SECDEF) and the Chairman of the Joint Chiefs of Staff (CJCS) in their congressional testimony on the FY 92-93 Defense Budget.

Assuming that these regional conflicts are indeed the threat of the future, the burden sharing precedents that are set as a result of the Persian Gulf War will certainly have far-reaching implications. Establishing clear, understandable guidelines to handle burden sharing issues in the years ahead are undoubtedly important policy considerations.

The purpose of this thesis is to stress the significance of economic principles to appropriately estimate the true costs of U.S. involvement in regional conflicts, like Operation Desert Shield/Desert Storm, from a burden sharing

perspective. This emphasizes the fact that there are critical differences between cost estimates for burden sharing purposes and cost estimates used to justify Congressional funding.

## B. OBJECTIVES

The objectives of this thesis are fourfold:

1. Provide a clear explanation of the major economic concepts underlying burden sharing issues critical to a full understanding of defense alliances.
2. Underscore the difficulties associated with measuring benefits and contributions appropriate for assessing equity in the distribution of the defense burden (using Operation Desert Shield/Desert Storm specifics as an example for future applications). In particular, develop an appropriate proxy for evaluating the oil supply security benefit.
3. Distinguish between the various interpretations of incremental costs desired for cost estimates and cost reports for Operation Desert Shield/Desert Storm.
4. Develop recommendations to help prepare the U.S. for burden sharing issues in future regional conflicts and multinational coalitions.

### C. RESEARCH QUESTIONS

#### PRIMARY:

Can financial cost estimates and cost reports for regional conflicts, such as the Persian Gulf War, adequately reflect appropriate costs from a burden sharing perspective?

#### SUBSIDIARY:

1. Which underlying economic principles should be considered in determining cost estimates for burden sharing purposes?
2. Why is disproportionality such a major issue of contention in defense alliances?
3. What were the major benefits and contributions to consider for Operation Desert Shield/Desert Storm?
4. What primary problems were encountered in analyzing costs and contributions during Operation Desert Shield/Desert Storm?
5. Are current proxies used to assess equity accurate and appropriate?
6. Did the U.S. set clear guidance as to the types of costs desired for cost estimates and cost reports for the operation?
7. Are different cost estimates required for burden sharing than were used for justifying supplemental funding?

8. What were the impacts of the operation for burden sharing issues that involve Congress, defense policy and the U.S. economy?
9. What lessons can be learned from Operation Desert Shield/Desert Storm to enhance burden sharing efforts in future multinational regional conflicts?

#### D. SCOPE

This thesis is a case study recommending the appropriate use of economic principles for estimating the U.S. costs of Operation Desert Shield/Desert Storm for burden sharing purposes. Assuming that similar types of ad hoc coalitions are probable in the future, this thesis emphasizes the distinction between costs for burden sharing applications and costs reflected in cost estimates, cost reports, and supplemental funding requests for Operation Desert Shield/Desert Storm. Recognizing the concern for equitable burden sharing in this type of defense alliance, the thesis explains the difficulties in measuring the relative benefits and contributions of participants, clarifies confusing issues concerning the inappropriate use of proxies, and stresses the need to focus on making the overall process more equitable.

This thesis does not attempt to estimate actual costs incurred during Operation Desert Shield/Desert Storm, nor does it attempt to determine the equitable amount of burden that should be shared by members of the coalition forces,

individually or collectively. This thesis does not compare the various budgetary cost estimates that have already been established by the Department of Defense (DoD), the Office of Management and Budget (OMB), the Congressional Budget Office (CBO), the General Accounting Office (GAO), the U.S. House of Representatives Appropriations Committee (HAC) and other sources. Nor does it examine the legitimacy of specific estimates or the validity of the actual methodologies used to calculate the specific dollar amounts.

#### E. ASSUMPTIONS

In the wake of such astonishing global events as the fall of the Berlin Wall and the collapse of the Communist Party in the Soviet Union, the United States finds itself as the only remaining world "super power." Prior to the end of the Cold War, there was a certain stability that pervaded world events because two super powers (the U.S. and the U.S.S.R.) opposed one another. With the fall of Soviet dominance comes less control over formerly allied volatile nations. With irrational, immoral leaders, like Saddam Hussein, the world is more unstable than ever before.

This thesis assumes that U.S. defense policy will continue to place increased emphasis on involvement in regional conflicts necessary to protect U.S. interests. A careful analysis of the burden sharing issues of Operation Desert

Shield/Desert Storm will have significant implications for similar multinational regional conflicts in the future.

#### F. METHODOLOGY

The research data for this thesis was collected in a number of ways. Extensive background reading in defense policy and economics was required to establish a sound base of knowledge from which to intelligently begin discussion. In addition to published books and academic studies, numerous reports issued by Congress, DoD, and various government agencies on burden sharing and costs of Operation Desert Shield/Desert Storm were included in the literature review. In particular, the Operation Desert Shield/Desert Storm supplemental appropriations bills, their corresponding congressional testimonies, and several reports on burden sharing issues from the Congressional Research Service (CRS) were thoroughly examined.

A research trip to Washington, D.C., in late July proved essential to the success of the research efforts. Interviews were held with high-ranking officials within the Department of the Navy Comptroller Office (NAVCOMPT), the Office of the Secretary of Defense (OSD) (specifically the International Security Policy, Comptroller, and International Economic and Energy Affairs offices), GAO (specifically the National Security and International Affairs Division), CBO, OMB (Deputy Director's office), as well as with senior staffers on the HAC

minority and the U.S. Senate Appropriations Committee (SAC) minority and majority. These interviews provided invaluable insight to the actual processes used and their application, as well as the politics involved throughout the process.

#### G. ORGANIZATION OF STUDY

Chapter II discusses the underlying economic concepts essential to clearly understand burden sharing in defense alliances, and examines the dilemma of accurately measuring equity among the burden sharing participants.

Chapter III analyzes benefits associated with Operation Desert Shield/Desert Storm. The oil supply security benefit is examined in greatest detail to evaluate its significance and to develop an appropriate proxy to measure coalition member's proportionality for burden sharing concerns.

Chapter IV discusses the various types of coalition contributions. Fulfillment of pledge commitments is addressed and collection of pledges is discussed.

Chapter V clarifies the confusion resulting from different interpretations as to what to include as "incremental costs" for U.S. cost estimates, cost reports, and supplemental funding requests for the Persian Gulf crisis.

Chapter VI concludes this thesis by reemphasizing the major objectives and providing recommendations to help prepare the U.S. for burden sharing issues in future regional conflicts and multinational coalitions.

## **II. UNDERLYING ECONOMIC CONCEPTS**

### **A. GENERAL**

Before analyzing the Desert Shield/Desert Storm cost estimates, the economic concepts upon which the burden sharing perspective is based must be understood.<sup>1</sup>

Undoubtedly, many people will find exception to such a reliance on economic principles. This is fully expected and understandable since application of economic concepts in the public arena is often difficult and many times counter to political objectives. However, economics provides the most appropriate base of knowledge to intelligently discuss burden sharing issues.

### **B. EFFICIENCY AND EQUITY**

Defense burden sharing concerns the division of responsibility and benefits among the members of a common defense alliance, where the alliance can be both formal or informal. The common perception is that financial and leadership responsibility should be divided so that the alliance is efficient (provides the given level of total defense for the minimum possible cost) and the relative

---

<sup>1</sup> This discussion of the major economic concepts underlying burden sharing issues relies heavily on "Burden Sharing: An Introduction to the Issues" by William R. Gates, Naval Postgraduate School, Monterey, CA, April, 1989.

burdens are equitable (there is a balance between the costs and benefits for each member nation).

Unfortunately, efficiency and equity are difficult to define and measure. In addition, individuals usually focus on their own self interests before concerning themselves with the well being of the alliance as a whole. As a result, efficiency tends to be ignored in most discussions and equity becomes the most important consideration for burden sharing situations. Therefore, there is a need to consider the dynamics of defense alliances to determine if equity is possible.

#### C. PUBLIC GOODS

Defense is a classic example of a "public good." There are two characteristics that distinguish these goods from typical goods. First, the good can be consumed simultaneously by more than one consumer without affecting the utility that any of the other consumers receive from the good. These goods are called "joint consumption goods" and are said to be "non-rivalrous" in consumption. Second, it is typically hard to exclude individuals from consuming the goods provided, even if they have not paid for the good. This property is referred to as "non-excludability." Goods that are both non-rivalrous and non-excludable are "public goods."

The economic theory of alliances is based on public goods theory. If alliance members share common objectives and also

honor their alliance commitment, mutual defense is both non-rivalrous and non-excludable to all alliance members (and many non-members). All resources deployed to the alliance's best advantage provide public benefits. Publicness is based on the commonality of the alliance's and the members' objectives and the degree to which resources contribute to the common objective, irrespective of the specific objectives of each member or each members level of contribution.

#### D. FREE RIDING

Once a public good has been provided, the benefits are available to all members. As a result, if the "public good" is provided through voluntary participation, each individual can purposely reduce his or her own contribution and rely on the contributions of others. In other words, each member has a tendency to "free ride". Free riding reduces the total quantity of a public good provided and shifts the burden of cost to those individuals who value the public good most highly. It also shifts the burden to individual members who have capacity and comparative advantage of providing the public good. Predicting the presence of free riding and the resulting sub-optimal quantity of defense goods has been economics' primary contribution to the on-going burden sharing debate. To the extent defense alliances provide public goods, the U.S. can be expected to bear a disproportionate share of the defense burden.

Because public goods theory suggests that equity in defense alliances is unlikely, there is a great deal of concern and desire to measure the contributions and benefits associated with the alliance. Unfortunately, the difficulty with measuring equity is substantial. As a result, quantifiable proxies are relied upon to closely approximate actual contributions and benefits. The focus then turns to defining and defending a quantifiable measure of equity.

#### **E. OPPORTUNITY COST AND MARGINALISM**

The opportunity cost concept is simply an understanding that any use of scarce (limited) resources will incur costs in terms of foregone alternatives that can no longer be undertaken elsewhere. DoD, facing a declining budget, is dealing with very limited resources. Therefore, opportunity cost becomes ever more relevant to DoD resource allocation problems.

A strict definition of economic marginalism is the cost or benefit associated with the production or consumption of one additional unit. In relation to defense, where one additional unit is not well defined and difficult to measure, marginalism becomes equated with incremental cost. Therefore, it entails looking strictly at the additional costs and benefits associated with a particular option or contingency.

Efficiency, an important concern of every burden sharing debate, requires that the marginal costs and the sum of the

marginal benefits of each burden sharing member be balanced. Therefore, for burden sharing purposes in defense alliances, the marginal (incremental) costs are the appropriate costs measure.

#### F. DISPROPORTIONALITY: THE PRIMARY BURDEN SHARING COMPLAINT

##### 1. Measuring Costs and Benefits

The true burden of war includes human, military and political, as well as financial components. "Fairness" in defense burden sharing often connotes some kind of proportionality between benefits and costs. However, voluntary transaction involving public goods typically results in a disproportionate distribution of costs among the participants. Even the optimal distribution, which maximizes the total welfare when each participant counts equally, generally results in a disproportionate cost distribution. This is due to the existence of the comparative advantage involving public goods and to the diverse economic capabilities measured in terms of GNP. If we are to ensure proportionality in costs and benefits, we must give a higher welfare weight to the country with a larger GNP, and to a country with more efficient public good production capability. Then the effort to provide "fairness" (i.e., proportionate burden share) actually leads to a truly inequitable action.

All defense alliance members argue that the defense burden should be distributed fairly, yet a "fair" distribution is never definable. There is no clear yardstick to use in determining if the burden is distributed fairly. Given the current secular preoccupation to equate proportionality with fairness, each participant has an incentive to overstate his or her contribution and to understate his or her benefits.

**a. Quantifiable Proxies**

To circumvent a lack of a proper equity measure, the burden sharing debate has historically relied on easily quantifiable proxies. Several different measures have been suggested and can be grouped into two general categories: input measures and output measures. Unfortunately, the politics involved force the burden sharing debate to rapidly degenerate into a measurement argument, as each country can select the measure that best supports their position.

(1) *Input Measures.* There are proponents and critics for every conceivable measure of input. Two of the most common measures are expenditures as a percent of GNP and per capita defense spending. Although these measures both have their strong points, they fail to consider several important but hard to quantify factors. These factors include: the value of land provided rent-free for U.S. bases in allied countries; the differing levels of funding for economic assistance which helps reduce tensions in the regions

of conflict; the market value of military manpower in those countries that rely on a draft system (although the quality of these troops is also debatable); the psychological and emotional costs of hosting foreign military troops; the differing levels of technology and productive efficiency across countries; and the efficiency of the mix of resources a country provides.

(2) *Output Measures.* In ad hoc coalitions such as Desert Shield/Desert Storm, many people feel that burden sharing should be based on defense capabilities rather than expenditures. Quantifiable proxies for defense capabilities include defense personnel (including ground, naval and air forces), airlift and sealift capabilities, military equipment, and various support. However, critics argue that defense output measures do not include several factors that affect the real value of a contribution: capability of troops and equipment (including availability of required logistics supplies, spares, and ammunition); ability to mobilize (location of troops and equipment); capability to resupply (surge capability); and troop training, leadership, and morale. These more qualitative factors are clearly difficult to quantify and are conveniently omitted from most common burden sharing calculations.

(3) *Shortcomings.* There are three main shortcomings of proxies for defense burdens: the measures tend to ignore benefits; there is disagreement as to what defense-related expenditures should be included; and it is not obvious as to how to adjust burdens based on ability to pay.

Several primary and secondary benefits that should be considered are difficult to quantify and therefore usually ignored. As a result, both the input measures and the output measures have typically focused on contributions. Without measuring benefits, it is impossible to determine if a country's benefits received are unequal relative to contributions. Claims of inequity based solely on a comparison of relative contributions without considering benefits received can lead to inappropriate conclusions.

The second area of disagreement is determining which defense related expenditures to include as part of a country's contributions to the allied defense effort. Some defense expenditures are committed directly and some indirectly to the allied effort. Several direct defense contributions are omitted in official measures of defense expenditures, including the value of property donated for foreign bases and training exercises, the true value of conscription forces, and foreign aid. There are also indirect contributions stemming from the quality of the resources provided that are equally difficult to quantify and omitted from official measures. In addition, the distinction between

the two is often not clear cut. Whether to include expenditures in these cases is understandably an area of debate. Also, there is debate over the definition of military expenditure. Depending on what is allowable under the strict definition for the coalition, different countries will be represented as greater contributors.

The last problem with proxies used to determine equity is that equity is defined in different ways. Some would argue for each member to contribute at an equal rate, such as per cent of GNP. Others firmly support that the most equitable process would rely on a progressive rate based on a member's ability to pay (typically determined by using GNP). The U.S. income tax system provides the most common example where a wealthier individual is required to devote a higher percentage of his or her income. If a coalition member's GNP increased or if their comparative advantage increased, they would then be expected to contribute at a higher rate. The two differences in opinion underscore that equity agreement is often impossible.

***b. Measuring Disproportionality Is Impossible***

In any defense alliance burden sharing situation, there is a great deal of concern over determining whether or not any countries are bearing a disproportionate share of the burden. Unfortunately, as mentioned above, identifying free

riders requires a comparison of the ratios of costs to benefits for each member.

To further complicate the issue, each country's appraisal of the benefits depends on a number of factors, including the value placed on the benefit and the country's perception of the degree of the threat.[Ref. 1] The same problems apply to valuing contributions. These numerous measurement problems make it impossible to develop a single, objective disproportionality index. Although some analysts have combined similar groups of countries together, which makes comparative analysis a little easier, comparisons across groups are dubious since they require comparing dissimilar costs and benefits.

As a result, disproportionality indices tend to focus on simplified descriptions of costs and benefits for which quantifiable proxies can be developed. Current proxies often ignore important factors such as ability to pay, perception of the degree of the threat, and intangible contributions. Although proxies are currently the only way to adequately approximate equity in burden sharing scenarios, there is still room for improvement. It must be remembered that there are advantages and disadvantages to each proxy, and in some cases, a particular proxy can be strategically chosen to support a desired political objective rather than an impartial economic outcome. The measurement problems

discussed above make it impossible to construct an objective  
disproportionality index that is universally accepted.

### **III. THE BENEFITS OF OPERATION DESERT SHIELD/DESERT STORM<sup>2</sup>**

As stated previously, in order for coalition countries to feel that the defense burden for Operation Desert Shield/Desert Storm was apportioned equitably, each member must feel that the ratio of costs to benefits of participation was the same for each country. Unfortunately, as would be expected, measuring equity for the operation is especially difficult because the costs and benefits to each country vary greatly. For ease of analysis, this thesis considered the following commonly discussed benefits: preserving national sovereignty, increasing regional and international stability, and ensuring the security of the Middle East oil supply.<sup>3</sup>

#### **A. NATIONAL SOVEREIGNTY**

National sovereignty is one obvious benefit that can be direct or indirect. Kuwait was the prime beneficiary of direct national sovereignty, receiving direct protection from

---

<sup>2</sup> This section of the thesis is based heavily on "Burden Sharing in the Persian Gulf: Lessons Learned and Implications for the Future" by William R. Gates and Katsuaki L. Terasawa, Naval Postgraduate School, Monterey, CA, 1992.

<sup>3</sup> This thesis treats the benefits discussed as purely public benefits. For a more detailed analysis distinguishing public from private benefits based on the degree to which defense resources are committed to the alliance, see "Commitment, Threat Perceptions and Expenditures in a Defense Alliance" by William R. Gates and Katsuaki L. Terasawa, International Studies Quarterly, 1992.

the coalition. Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates also directly benefitted, though to a lesser degree. However, numerous other countries also benefitted that were not directly threatened by Iraq. These countries are in a position very conducive to free riding.

Operation Desert Storm also served to increase the perception that there is a credible commitment of larger nations to protect smaller nations, both formally or informally allied. Perceived commitment has a great deal of impact on the value placed on both costs and benefits.<sup>4</sup> Many persons agree that because this perceived commitment increases, the necessity of this type of action in the future will decrease.<sup>5</sup> The United States and some of the other Western European countries receive a benefit of indirect national sovereignty by acting in the role of "world policemen" because the necessity of having to protect other countries in the future is reduced. Assuming that the U.S. is restructuring Defense Department capabilities toward the new

---

<sup>4</sup> Further discussion on the impacts of credibility of commitments to an alliance can be found in "Commitment, Threat Perceptions and Expenditures in a Defense Alliance", William R. Gates and Katsuaki L. Terasawa, International Studies Quarterly, 1992.

<sup>5</sup> President Bush acknowledged this U.S. national sovereignty benefit at a news conference on March 1, 1991. According to President Bush, victory in the Persian Gulf reduces the risk that the U.S. will have to go into battle of this type someplace else in the future. (Gates and Terasawa, "Burden Sharing in the Persian Gulf: Lessons Learned and Implications for the Future", 1992)

post-Cold War threat, the U.S. would definitely benefit from any decrease in the possibility of regional conflicts.

#### **B. REGIONAL AND INTERNATIONAL STABILITY**

The Persian Gulf has never been known for its stability. The area's marked instability can be attributed to several factors too numerous to discuss here, but the fact that reducing that instability would definitely provide benefits to many countries warrants discussion.

By invading Kuwait, Saddam Hussein's was taking another step towards establishing Iraq as the dominant power in the region. Timely U.S. intervention was necessary because if Hussein had taken control of all Gulf Cooperation Council (GCC) oil, the resultant accumulation of wealth and political leverage would have enabled him to increase his military power and capabilities. The regional conflict could have rapidly escalated to an explosive Israel/Palestine issue. The U.S. clearly had to take action. To have ignored the crisis longer would have potentially made the costs of intervention tremendously more expensive. The successful actions of the coalition forces thwarted Hussein's plans and thereby provided varying benefits to the coalition nations.

The benefits vary depending on each nation's perception of the desired regional order and on their feeling towards foreign (particularly Western) intervention. The oil-rich Gulf Cooperation Council (GCC) states probably received the

greatest benefit because not only did they favor maintaining the status quo in the region, but they also had previous ties with the U.S. and therefore most likely had less problems with U.S. intervention.<sup>6</sup> There are other countries, such as Syria and Egypt, that also benefit from seeing Iraq's regional power reduced. While they might have preferred seeing the invasion of Kuwait resolved using regional forces, both have ties with the GCC and the U.S., and are therefore less likely to be adamantly opposed to western participation (especially when it was as effective as it was).

It is easy to imagine that if the Iraq invasion had spread beyond Kuwait into other countries, many more nations would have been directly and indirectly affected. The value of benefits associated with preventing this Iraqi aggression depends on the perception of this threat widening to a truly international conflict.<sup>7</sup> Because this value would also have

---

<sup>6</sup> After the 1979 Iranian revolution, Soviet intervention in Afghanistan, and the Iran-Iraq war, the U.S. and the GCC established military ties. Regional sensitivities precluded overt military ties, but the U.S. received limited permission to use military facilities in Bahrain and Oman (and Egypt). More importantly, Saudi Arabia established a \$50 billion Gulf-wide air defense system, built to U.S. and NATO specifications. This system included Airborne Warning and Control System (AWACS) planes and several bases, some designated by the U.S. Army Corps of Engineers, with stocks of fuel, parts and munitions. The U.S. intended to provide front-line forces in any crises, after a public invitation from the area's ruling families. (Gates and Terasawa, 1992.)

<sup>7</sup> An in-depth analysis on the effects of threat perceptions can be found in "Commitment, Threat Perceptions and Expenditures in a Defense Alliance", William R. Gates and Katsuaki L. Terasawa, International Studies Quarterly, 1992.

to include the political and economical costs of each and every country's involvement and the impact of international instability on international trade, it is virtually impossible to assess and will therefore not be discussed further.

### C. OIL SUPPLY SECURITY

Although national sovereignty and regional and international stability are extremely difficult to measure, the oil supply security benefit, though just as complex, is a little more tangible. However, the emphasis that most people put on the tremendous degree of benefit gained by guaranteeing oil supply security is greatly overestimated.<sup>8</sup>

The most common perception is that the countries most reliant on Persian Gulf oil would gain the most benefit from ensuring the oil supply. Unfortunately, it is inappropriate to associate the value of the oil supply security benefit with reliance on Persian Gulf oil. Because the world oil market is an integrated market, disruptions in supplies from Iraq and Kuwait will impact more countries than just consumers relying heavily on those two suppliers. The oil supply security benefit's economic value is actually related to the impact that world oil prices have on current and future Gross Domestic Product (GDP). Sharp oil price increases tend to

---

<sup>8</sup> Discussion of the oil supply security benefit is based heavily on Gates and Terasawa, "Burden Sharing in the Persian Gulf: Lessons Learned and Implications for the Future", Naval Postgraduate School, Monterey, CA, 1992.

cause recessions. The length of the recession is directly related to the length of the price increase. If price increases are temporary, the effect on GDP is also temporary.

The impact of world oil prices on GDP is related to three factors: the impact on consumption, aggregate supply, and investment. The consumption effect is related to oil imports. Aggregate consumption is determined by national income. World oil price increases transfer income from oil importing to oil exporting countries. The aggregate supply effects are the same for both oil importers and exporters. Sharp oil price increases reduce aggregate supply for all countries. Finally, assuming no change in the nominal money supply, increases in oil prices reduce real money balances for oil importing countries, thus increasing interest rates and reducing aggregate investment.

The overall impact depends on the overall balance of these reactions. In particular, the consumption impact depends on the share of imported (exported) oil in GDP, the aggregate supply impact depends on share of oil consumption in GDP, and the investment impact depends on sensitivity of both interest rates to the demand for money and of investment to interest rates. The net balance of these effects will vary across countries.

The U.S. Senate Budget Committee commendably attempted to use benefits within its measurement criteria when it equated benefits from Operation Desert Storm to percentage dependence

on Persian Gulf oil imports. However, the results of their measurements must be caveated. Because the use of different proxies can often present different results, the door is open to possible manipulation. Whether the Senate Budget Committee's choice was more of a strategic one than one of naivety, their results serve a political purpose of representing the U.S. as sharing a disproportionate share of the burden. Figure 1<sup>9</sup> shows the Senate's view. However, the simplicity of their estimate is probably misleading.

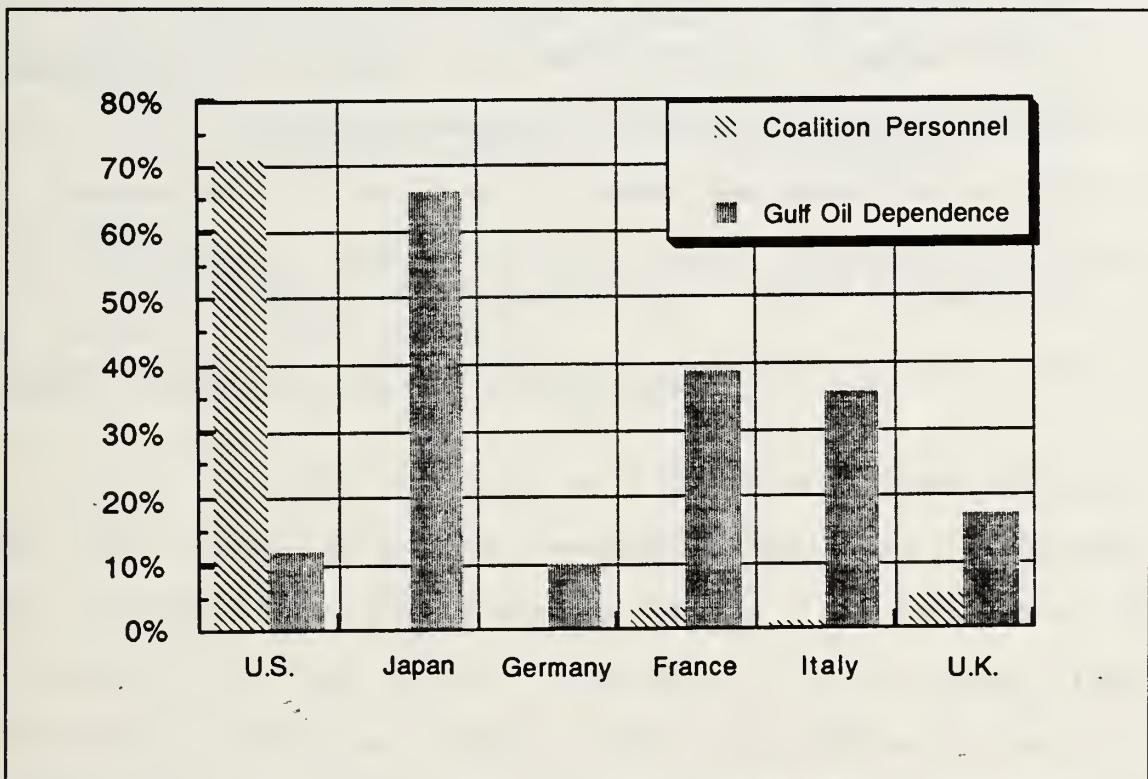


Figure 1. U.S. Senate's View: Gulf Oil Dependence vs Personnel Contributed

<sup>9</sup>Source: Senate Budget Committee, "Review and Analysis of President Bush's 1992 Budget", February 6, 1991, p. 23.

Generalizations that sharp oil price increases have a greater impact on countries relying more heavily on imported oil may be wrong. In fact, the value of the oil supply security benefit depends on the country's elasticity of GDP with respect to changes in oil prices.

Figure 2<sup>10</sup> is a simulation that compares the impact to GNP from increased oil prices for a 100% oil importer, such as Japan, a 50% oil importer, similar to the U.S., and a 0% oil importer (a net oil exporter), such as Kuwait. The simulation shows that if GNP is more sensitive to oil price increases for the 50% importer than for the 100% importer, the decrease in GNP is actually greater for the 50% importer.

---

<sup>10</sup>Source: Gates and Terasawa, "Burden Sharing in the Persian Gulf: Lessons Learned and Implications for the Future", Naval Postgraduate School, 1992.

	Country 1	Country 2	Country 3
Initial Dependence on Foreign Oil	100%	50%	0%
Oil Price Increase due to 50% Supply Cut	15%	15%	15%
Loss in GNP	3%	5%	42%
Oil Price Elasticity of GNP	-0.23	-0.35	-2.78

Note for the simulation:

1. Oil is only produced by Country 2 and 3, while non-oil products are only produced by Country 1 and 2.
2. The production functions for non-oil products are assumed as follows :  $Q_1=Z_1^{0.2}$ , and  $Q_2=0.9 Z_2^{0.6}$ .  $Z_i$  denotes amount of oil required for this production.
3. The utility functions in the three countries are assumed to be the same and are given by:  $U_i= X_i^{0.1} Y_i^{0.8}$  for  $i=1,2,3$ .  $X_i$  denotes final oil consumption by Country  $i$ , and  $Y_i$  denotes final consumption of non-oil products.
4. Oil resources for Country 2 is given by  $R_2=7.5$ . Oil resources for Country 3 is given by  $R_3=10$ . This amount, however, is reduced by one half to simulate the supply interruption.

Figure 2. Simulation of Oil Price Increase on GNP

Figure 3<sup>11</sup> shows the results of an International Monetary Fund (IMF) study using more reasonable, realistic assumptions that supports the simulation in Figure 2. Dependence is irrelevant to how GNP is affected. The energy price elasticity of GNP, and not per cent dependence, is what is significant. This confirms that using strict dependence on

---

<sup>11</sup>Source: World Economic Outlook, October, 1990, IMF, pp. 34-35.

Persian Gulf oil as a proxy to measure burden sharing proportionality is inappropriate. [Ref. 2]

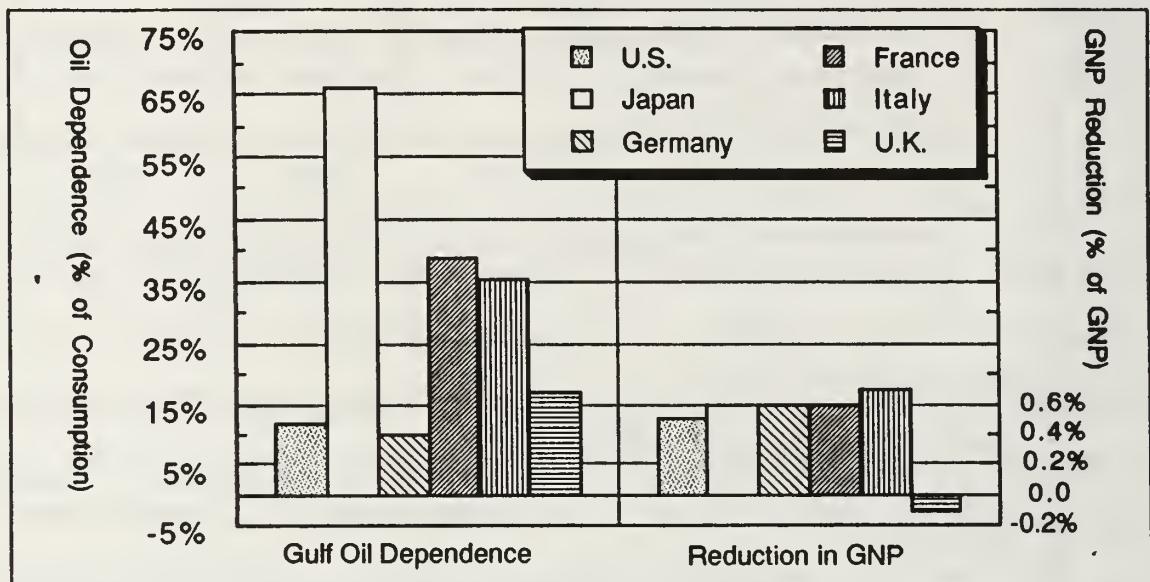


Figure 3. IMF Study of 50% Price Increase on GNP

Given a country's elasticity of GDP with respect to oil price, the value of the oil supply security benefit is measured by comparing expected world oil prices with and without coalition intervention. As it turns out, the long run increase in the price of oil is roughly the same, with or without coalition intervention. Assuming that Iraq clearly

Assuming that Iraq clearly wanted to raise oil prices<sup>12</sup>, there are many reasons to expect that an Iraqi monopoly of the Persian Gulf oil supply would have resulted in a price increase that would be limited and temporary.

One reason for the lack of permanency is that price increases become counter-productive after a point. In the short run, consumers begin conserving oil and looking for alternative energy sources. In addition, world GDP falls. In the long run, alternate energy technologies are developed. Both these reactions reduce oil consumption. Oil price increases can actually reduce oil revenues if the quantity demanded falls sufficiently.

There is also a supply side response. Higher oil prices encourage other oil producers to increase output in the short run. In the long run, expansion of existing oil production facilities and exploration for new reserves is encouraged. These responses put further downward pressure on world oil prices.

---

<sup>12</sup> An oil price dispute was the reason Iraq initially offered for invading Kuwait. In early 1990, Iraq lobbied OPEC to raise oil prices to \$20 per barrel. This request was denied, and oil prices fell to as low as \$14 per barrel. Iraq alleged that Kuwait and the United Arab Emirates were involved in a Washington-encouraged conspiracy to depress world oil prices by exceeding their OPEC sanctioned production quotas, thereby destroying Iraq economically and diminishing its regional power. Iraq's adherence to its claim eventually culminated in Iraq's invasion of Kuwait. (Gates and Terasawa, "Burden Sharing in the Persian Gulf: Lessons Learned and Implications for the Future", 1992)

In fact, temporary increases in world oil prices because of coalition intervention may have been more severe than if Iraq's invasion of Kuwait (and possibly the rest of the Gulf Cooperation Council states) had been unchallenged. After the embargo on Iraqi and Kuwaiti oil, oil prices increased due to the combined effects of reduced supply and speculative demand. It is unlikely that Iraq would have reduced world oil supply to this extent, so the supply impact would have been less. In addition, although the prices would have increased a little, the presence of at least some Iraqi and Kuwaiti oil exports may have reduced speculative demand, further mitigating the price increase.

Much of the general public perceived the primary oil supply security benefit for Operation Desert Storm as destruction of Iraq's ability to raise long run oil prices. However, even without coalition intervention, long run oil price increases, as discussed above, would have been improbable. Figure 4<sup>13</sup> shows that the price of oil, in the long run, is roughly the same with or without coalition intervention against Iraq. The normal price of oil prior to Operation Desert Shield/Desert Storm was \$15 to \$17 per barrel. The actual market price of oil during the operation climbed to as high as \$32 per barrel, but eventually decreased back to a normal level. Using estimates derived from oil

---

<sup>13</sup> Source: Love, James P., "Costs of the U.S. War with Iraq", Public Citizen, February 5, 1991, p. 26.

production and supply data provided by the Energy Information Administration (EIA), the estimated price increases due to the international sanctions are also shown. Had Iraq been left alone to take over Kuwait, and possibly even Saudi Arabia, prices would have similarly been raised initially but, as discussed above, would have eventually declined back to normal levels.

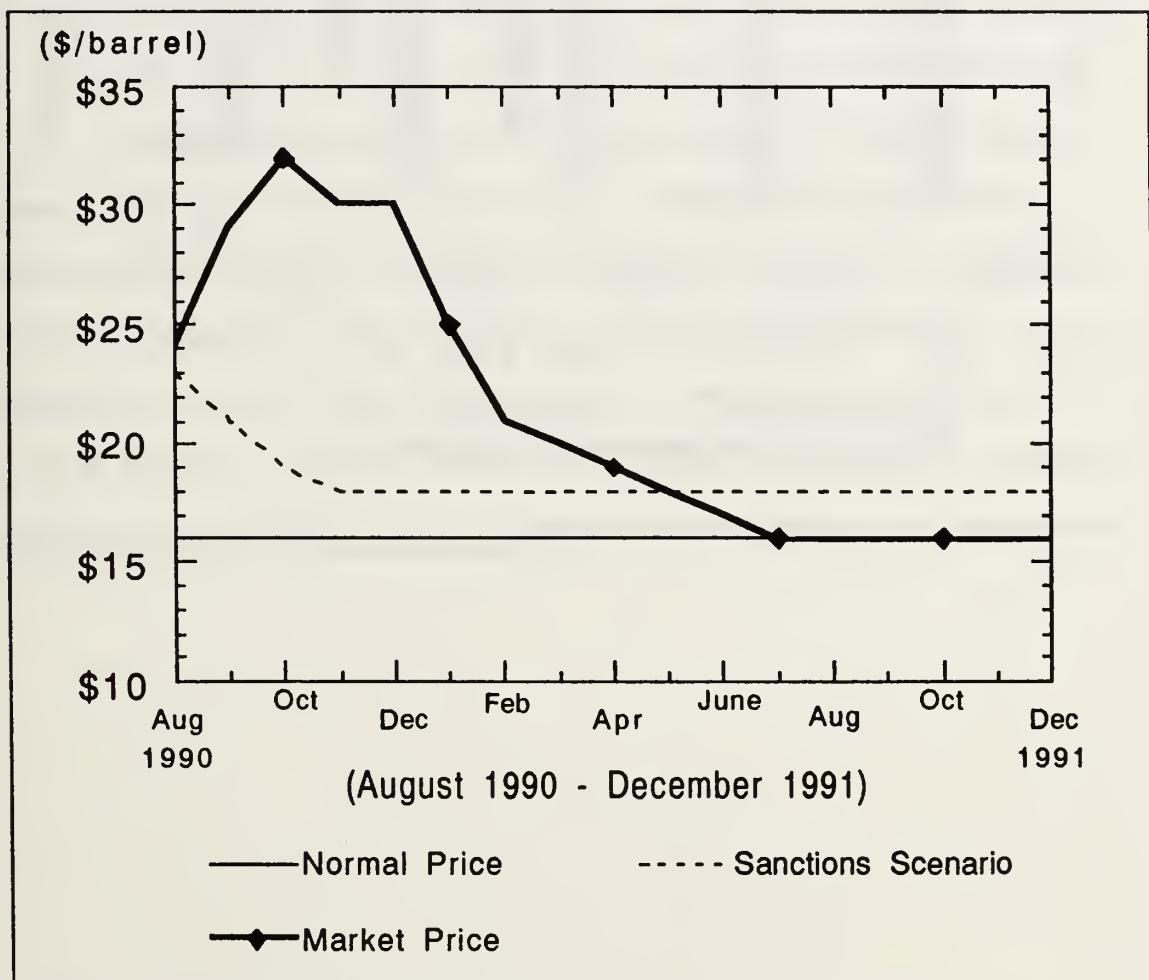


Figure 4. Effects on the Long-Run Price of Oil

Although ensuring oil supply security is a benefit of the Gulf War, Operation Desert Shield/Desert Storm probably only

had a minor impact on oil supply security worldwide. Particular countries' dependance on oil is not critical to world oil market security. Figure 5<sup>14</sup> shows changes in total world oil production during the first five months of the Persian Gulf Crisis to be minimal. In fact, net world oil production actually increased by November, 1990. Many people were quick to jump to the conclusion that the U.S. absolutely had to intervene in the annexation of Kuwait to prevent Iraq from drastically increasing the long run price of oil. This justification, though publicly popular, is dubious.

Measuring benefits, as seen above, can be terribly complex. Attempts to measure equity in previous situations have historically relied solely on measuring relative contributions. However, it is clear that the most appropriate method to measure equity in burden sharing issues must also account for relative benefits.

---

<sup>14</sup>Source: *International Petroleum Statistics*, EIA, Department of Energy (DOE).

Production changes as a % of July 1991 world total

(July 1991 World Total, 60 million barrels/day)

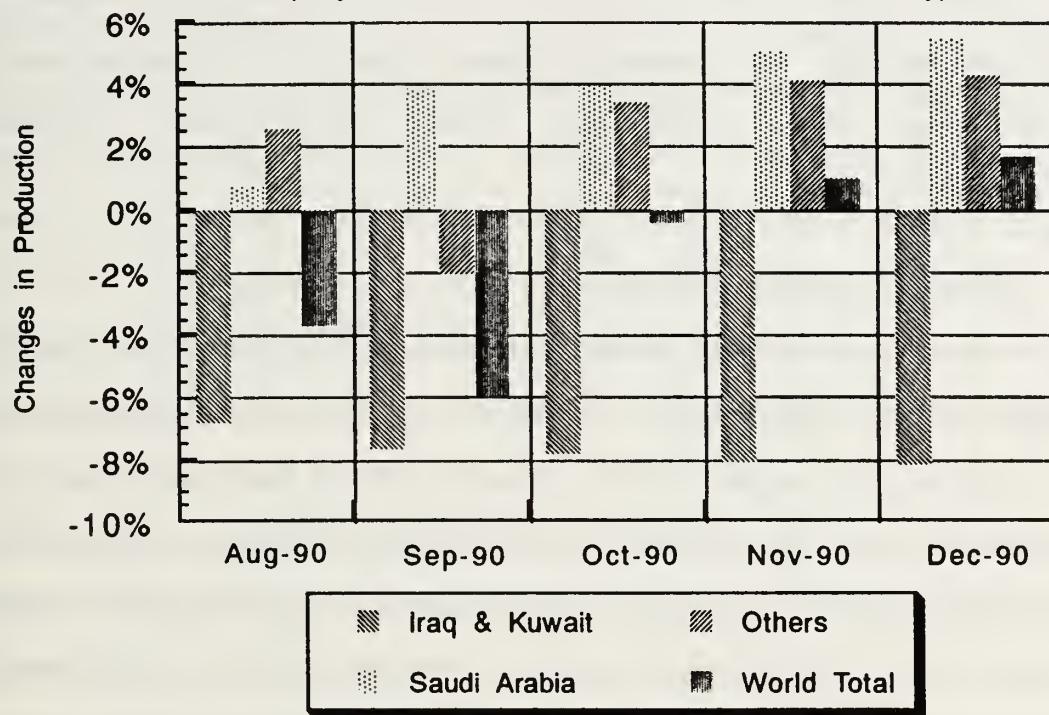


Figure 5. World Oil Production Recovery

#### **IV. CONTRIBUTIONS OF OPERATION DESERT SHIELD/DESERT STORM**

The costs to each of the coalition members of participating in Desert Storm are best represented by measuring each country's total (not just financial) contributions.

##### **A. ALLIED CONTRIBUTIONS**

Following the Iraqi invasion of Kuwait, and the commencement of Operation Desert Shield, President Bush sent Secretary of State Baker, Secretary of Defense Cheney, and Secretary of the Treasury Brady to the Persian Gulf, Europe, and East Asia to obtain commitments to offset U.S. military costs in the Gulf region and to provide economic assistance to countries affected by the embargo. Congress fully supported the President's decision to seek additional monetary and non-monetary contributions from the allies, not only to increase the other coalition countries' share of the cost of the operation, but to promote the opportunity to fund the cost of the war for the United States. Congress saw that this would directly reduce the level of supplemental appropriations necessary to cover U.S. costs, which would be very popular with the taxpayers.

These "Tin Cup"<sup>15</sup> missions targeted industrialized nations that had not sent military personnel to the Gulf and oil rich Arab monarchs that the U.S. was protecting. The initial round of solicitations produced commitments of roughly \$9.7 billion for U.S. military costs and over \$10 billion for economic support for front line and other countries. By January, after the outbreak of hostilities and a second round of allied requests, and as a result of the outbreak of hostilities, fifty countries had either pledged or contributed some type of support. The financial and in-kind contributions totalled to roughly \$54 billion.

Measuring each country's contribution is extremely difficult because the pledges and contributions varied widely in content. Contributions and pledges included military forces, cash donations to the U.S. Treasury, in-kind assistance, economic aid to countries affected by the crisis, host nation support to coalition troops in the Gulf region and other more intangible types of support.

### **1. Military Forces**

During the Persian Gulf crisis, 36 countries sent ground, air, and naval forces or support units to the Persian Gulf. [Ref. 3] Coalition countries had committed over 245,000 troops, 64 warships, 650 combat aircraft and 950

---

<sup>15</sup> The term "Tin Cup" was used by Dave Tarbell, Director of International Economic Affairs, Office of the Secretary of Defense, in an interview on July 24, 1991.

tanks. [Ref. 4] Although these military force contributions significantly enhanced the defense capabilities of the coalition, the financial value of military forces is not included in any of the contribution reports. Issues of quality of vehicles and quality of troops provided (conscription forces versus all-volunteer militaries) further complicate the valuation of this type of contribution.

## **2. Financial Contributions**

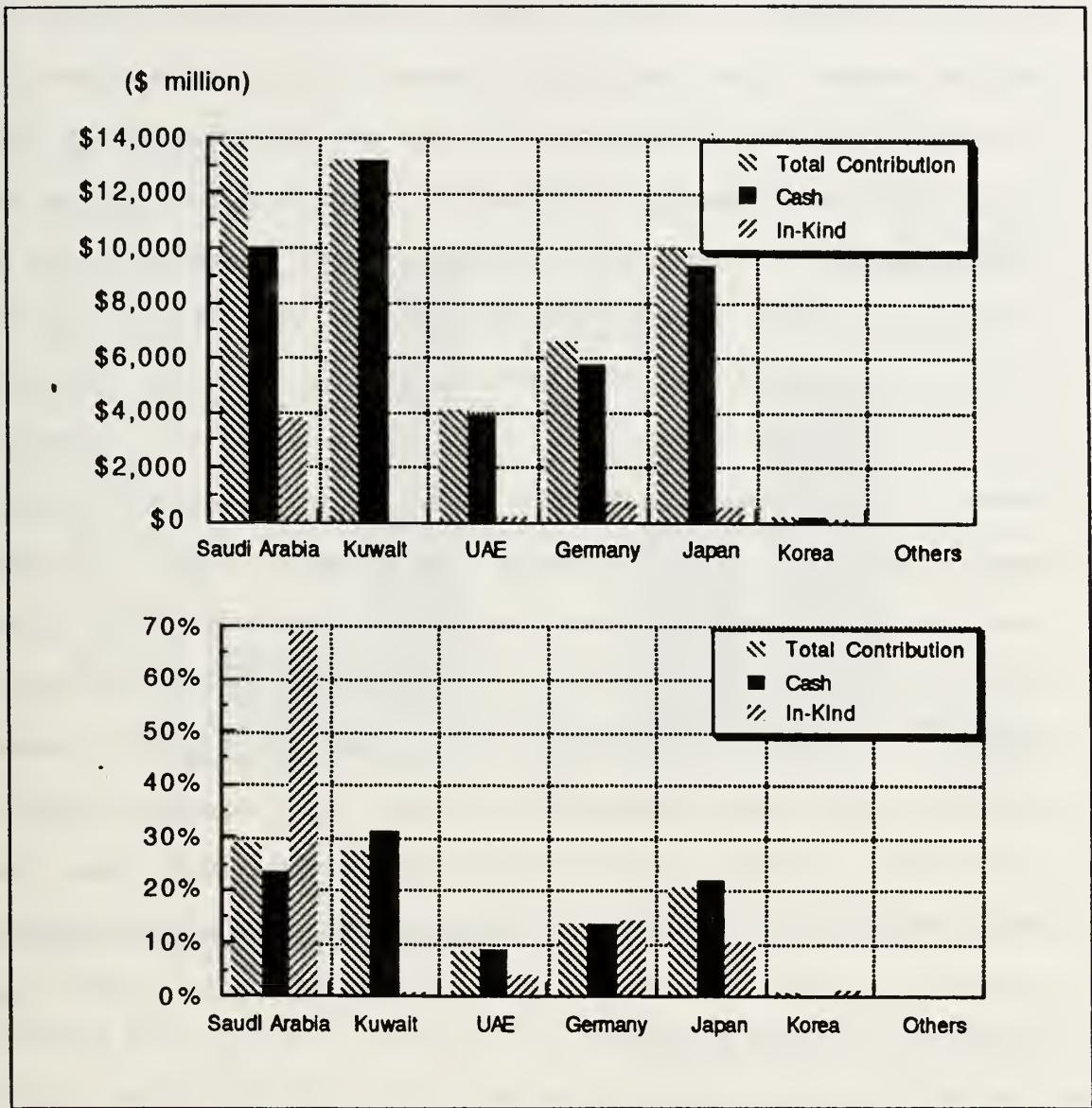
Cash pledges and contributions were a major concern to the U.S. Therefore, they were tracked meticulously. The FY 91 Desert Shield/Desert Storm Supplemental required monthly reports to Congress on the pledges made and received. Allied cash and in-kind contributions from the first seven OMB reports, as required by Congress, from March through September 1991 are summarized by amount and by percentage in Figure 6.<sup>16</sup> As an example, the seventh required report, dated September 16, 1991, is included as Appendix A.

## **3. Host Nation Support**

Host nation support from Saudi Arabia included fuel, food, water, housing, building materials, local transportation and port handling services. Valuating Saudi Arabia's host nation support was especially uncertain because, unlike other countries that pledged a specific amount, the Saudis made an

---

<sup>16</sup> Source: OMB Desert Shield/Desert Storm Monthly Cost Reports.



**Figure 6. Allied Cash and In-Kind Contributions**

open-end commitment to support U.S. forces. Saudi Arabia also committed to funding transportation for U.S. forces travelling to the Gulf from Europe and the U.S.

The windfall profiteering reports made against our Arab coalition partners (especially Saudi Arabia) were overestimated. Although Saudi Arabia experienced substantial

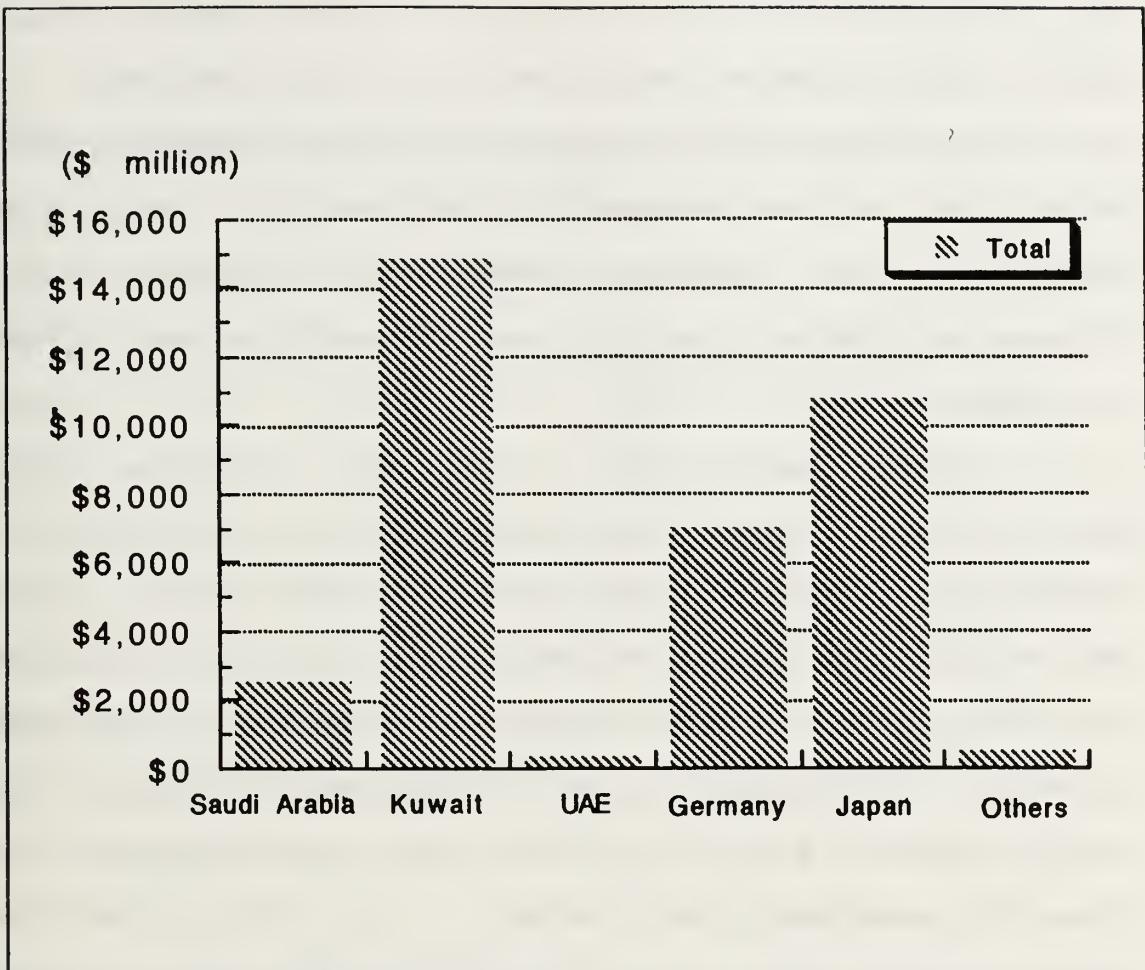
increased revenues due to the increase in oil prices, host nation support to coalition forces, aid to the front line states and other affected nations, and investment to expand oil production capacity mitigated their profits. It is still true, however, that Saudi Arabia made some profit from Operation Desert Shield/Desert Storm. What is not true is that Saudi Arabia was necessarily the nation that was guilty of the greatest net profit from the operation. Figure 7<sup>17</sup> shows the net contributions (total contributions including cash, in-kind, and economic assistance minus increased revenues) for some of the countries affected by the Persian Gulf Crisis. Saudi Arabia's contribution is not as large as Figure 6 seemed to indicate. Additionally, Figure 7 assumes that it cost Saudi Arabia \$4 billion to increase their oil production, as they have claimed. Had their cost been lower, their net contribution to the operation could easily have been negative (a net benefit). United Arab Emirates (UAE) shared a very similar position.

#### **4. In-Kind Assistance**

In-kind assistance encompasses several types of support, including host nation support. U.S. Central Command (CENTCOM) and U.S. Transportation Command had the responsibility for determining the value of in-kind support.

---

<sup>17</sup> Source: OMB Desert Shield/Desert Storm Monthly Cost Reports and *International Petroleum Statistics*, EIA, DOE.



**Figure 7. Coalition Net Contributions**

Because they did not always have access to data on a country's actual expenditures, the value assigned was estimated as reasonably as possible using information provided verbally from local suppliers, prices paid under previously held U.S. contracts, and other standard U.S. cost factors. For example, CENTCOM used a standard price per gallon to value fuel supplied to U.S. troops in Saudi Arabia based on an average price paid by DoD in September 1990 for jet fuel. [Ref. 5] As another example, CENTCOM officials

determined the value of food supplied to the U.S. troops in Saudi Arabia based on the amount paid to contractors under U.S. contracts before the Saudis assumed responsibility for the contracts in November, 1990.[Ref. 6] The actual amount paid by the Saudi government is unknown. For a breakdown by country and by type of in-kind assistance, refer to Appendix B.<sup>18</sup>

There are actually two ways to value in-kind assistance: budgetary and burden sharing. The focus of the budgetary approach is to determine how much the U.S. saves as an offset to supplemental funding from each type of assistance received. This, in fact, seemed to be the focus of CENTCOM's purpose, as the value of in-kind assistance was measured as it was delivered. A more inclusive burden sharing approach would focus on determining the value of the contribution to the contributing country (i.e., the opportunity cost to the donor country).

---

<sup>18</sup> Source: OMB Desert Shield/Desert Storm Supplemental Act Supplementary Information, February 22, 1991, pp. 108-109.

## 5. Economic Aid

Economic aid consisted of assistance to front line states (Turkey, Jordan, and Egypt), Kuwait, Israel and others. The aid assisted nations suffering from the effects of international economic sanctions against Iraq. It also assisted in covering costs for refugees fleeing Iraq and occupied Kuwait as well as for Kurdish refugees. The U.S. forgave repayment of Egypt's \$7 billion debt and is considering giving substantial foreign aid to Israel and Turkey, in particular, both of which stood by the U.S. during the war. Of course, the opportunity cost of Egypt's debt forgiveness can possibly be discounted because the debt may never have been fully paid off. Although these impacts to U.S. finances are a direct result of the Persian Gulf crisis, they are not reflected on either cost reports or DoD cost estimates of the full incremental costs of the war. A burden sharing estimate would certainly include these additional opportunity costs. The U.S. State and Treasury Departments had more detailed information on the disbursements of these contributions, but because the political sensitivity of the data, it was unavailable for this thesis. A GAO summary of economic assistance to front line states and other countries is shown in Figure 8.

In one of the most innovative burden sharing actions for economic aid, President Bush established the Gulf Crisis

**Economic Assistance to Frontline States and Other Countries**  
(Dollars in millions)

	Frontline States		Other Countries <sup>a</sup>		TOTAL		
	Pledge	Contri- butio n	Pledge	Contri- butio n	Pledge	Contri- butio n	
<b>Gulf States</b>	<b>\$6,168</b>	<b>\$3,863</b>	<b>\$3,636</b>	<b>\$2,845</b>	<b>\$9,804</b>	<b>\$6,708</b>	<b>68%</b>
Saudi Arabia	2,848	2,188	1,833	1,463	4,681	3,651	78%
Kuwait	2,500	855	1,184	763	3,684	1,618	44%
UAE	820	820	619	619	1,439	1,439	100%
<b>EC</b>	<b>3,039</b>	<b>1,225</b>	<b>177</b>	<b>1</b>	<b>3,216</b>	<b>1,226</b>	<b>38%</b>
EC funds	805	624			805	624	78%
France	200	0	30		230	0	0%
Germany	1,195	462	137		1,332	462	35%
Italy	650	37	9		659	37	6%
Other EC <sup>b</sup>	189	102	1	1	190	103	54%
<b>Japan</b>	<b>2,126</b>	<b>803</b>	<b>481</b>	<b>9</b>	<b>2,607</b>	<b>803</b>	<b>31%</b>
<b>Others</b>	<b>413</b>	<b>112</b>	<b>99</b>	<b>62</b>	<b>512</b>	<b>174</b>	<b>34%</b>
Korea	98	19	17	2	115	21	18%
Norway	24	7	82	60	106	62	63%
Switzerland	120	16			120	16	13%
Other <sup>c</sup>	171	70			171	70	41%
<b>Total</b>	<b>\$11,746</b>	<b>\$6,003</b>	<b>\$4,393</b>	<b>\$2,908</b>	<b>\$16,139</b>	<b>\$8,911</b>	<b>55%</b>

SOURCE: Treasury Department, May 10, 1991

<sup>a</sup> Bangladesh, Djibouti, Lebanon, Morocco, Pakistan, Somalia, Syria, and Tunisia.

<sup>b</sup> Belgium, Denmark, Ireland, Luxembourg, the Netherlands, Portugal, Spain, and the United Kingdom.

<sup>c</sup> Australia, Austria, Canada, Finland, Iceland, and Sweden.

**Figure 8. Summary of Economic Assistance**

Financial Coordination Group (GCFCG) as an international effort to provide financial assistance. The group coordinated bilateral contributions from 24 donor countries, including GCC members (i.e., Saudi Arabia, Kuwait and other oil rich Gulf countries). Japan, Korea and several European countries. [Ref. 7] If the GCFCG donors were to discontinue

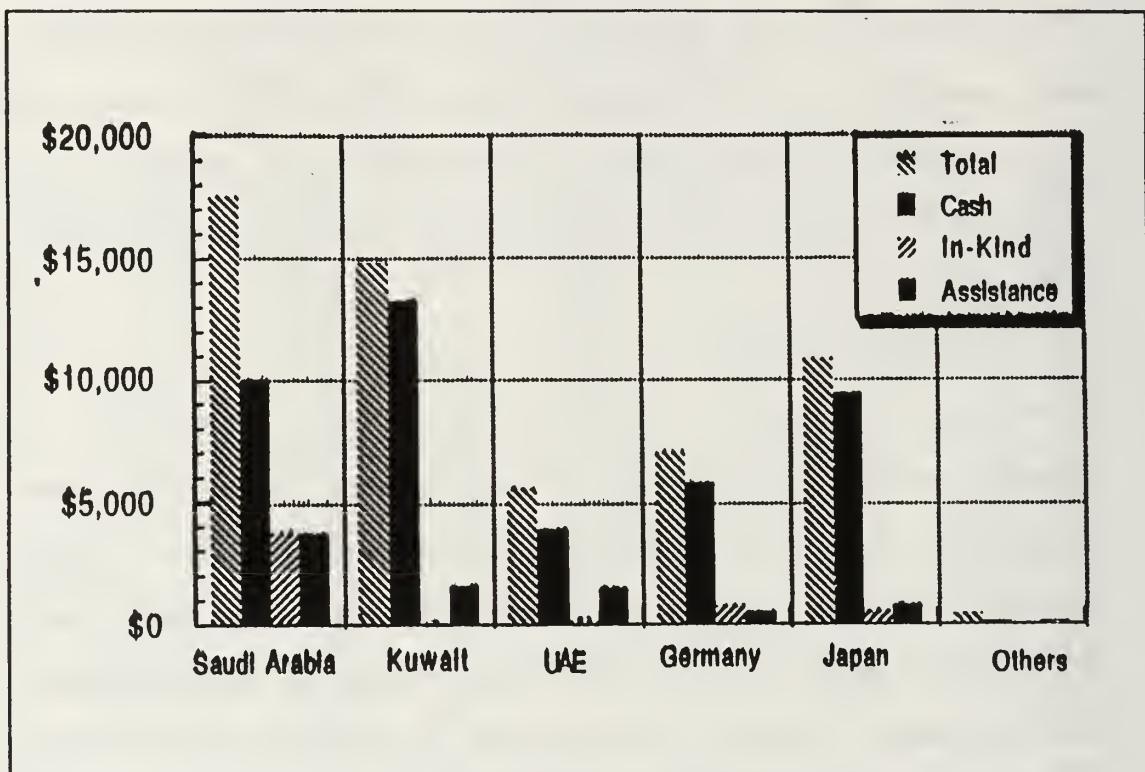
aid, the U.S. would be forced to assume a substantial size of the aid burden which would obviously increase U.S. cost of involvement in the Persian Gulf. Establishment of this type of cooperative international organization for economic aid is one example of the lessons learned from Operation Desert Shield/ Desert Storm that would be wise to duplicate in the future.

#### **6. Other Support**

In addition to all of the types of allied contributions above, there are other contributions, not included in the contribution reports, that should be recognized. For example, Germany deployed a fighter squadron to Turkey, ships to the eastern and central Mediterranean Sea, and pledged about \$2.7 billion in military assistance to Turkey, Israel, and the United Kingdom. Similarly, Japan sent oil booms to Saudi Arabia to assist in counteracting the Gulf oil slick.[Ref. 8] To be fair in determining equity of burden sharing, all contributions (above and beyond simply financial and in-kind assistance) should be counted in tallies of a country's total contributions, despite the measurement difficulties involved.

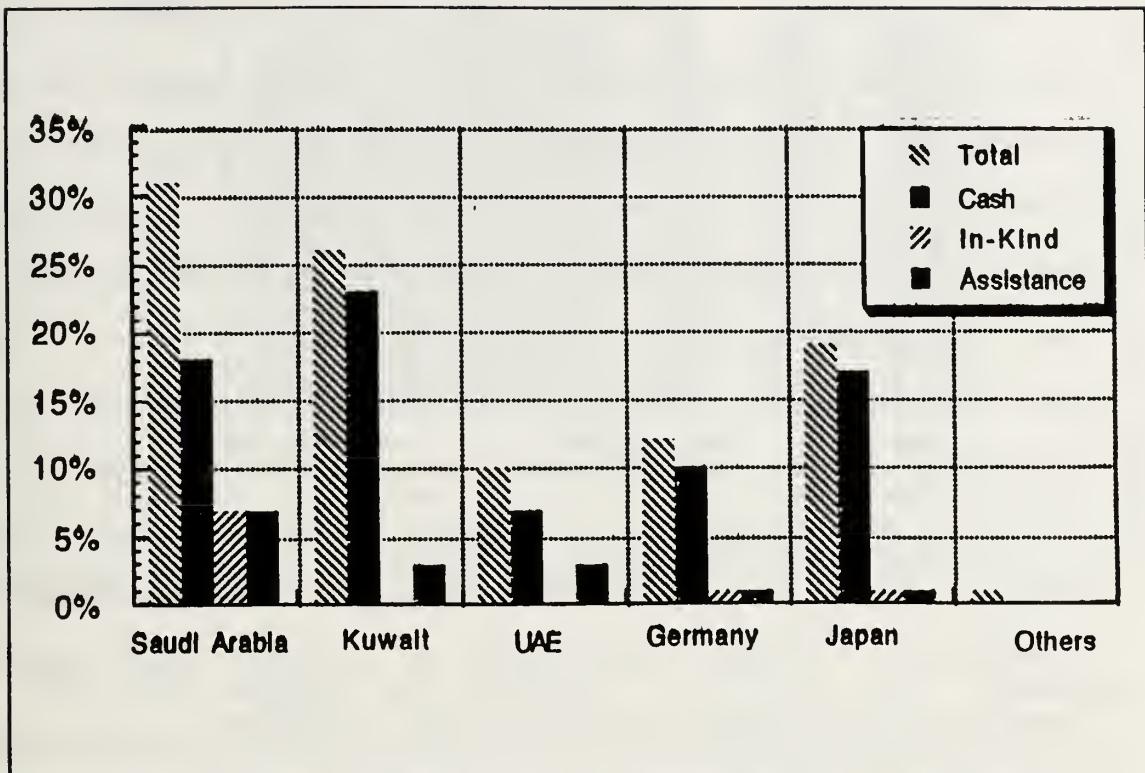
Figures 9 and 10 show the totals of cash, in-kind, and economic assistance attributed to coalition member countries by dollar amount and percentage of total coalition assistance,

respectively.<sup>20</sup> These figures do not include "other assistance," as discussed above.



**Figure 9. Cash, In-Kind, and Economic Assistance by Dollar Amount**

<sup>20</sup> Source for Figure 9 and Figure 10: OMB Desert Shield/Desert Storm Monthly Cost Reports.



**Figure 10. Member's Assistance as a Percentage of Total Coalition Assistance**

#### B. COLLECTING ON ALLIED PLEDGES<sup>21</sup>

Burden sharing emerged as a major issue for Congress when President Bush decided to enforce the United Nations-sanctioned trade embargo of Iraq. The prospect that costs of military operations in the Persian Gulf could eliminate the "peace dividend," hoped for from the decline in the Soviet threat, created strong sentiment in Congress that the burdens of the Iraq crisis should be shared internationally.

---

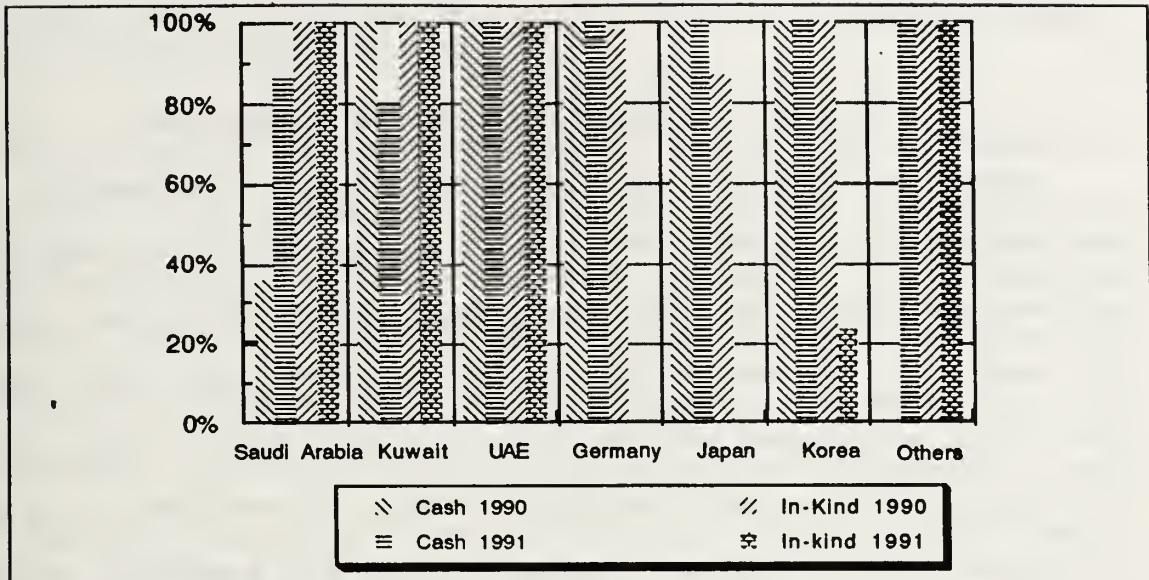
<sup>21</sup> This discussion based heavily on "Iraq/Kuwait Crisis: The International Response and Burdensharing Issues", Gary J. Pagliano, CRS Report, June 26, 1991 and "The Persian Gulf War: U.S. Costs and Allied Financial Contributions", Stephen Daggett and Gary J. Pagliano, CRS Issue Brief, July 19, 1991.

As projected U.S. costs grew larger, the burden sharing issue became more heated. In fact, it was a central matter of contention in the congressional debate over granting the President authority to use force against Iraq. [Ref. 9] Members of Congress were skeptical that promised pledges from our coalition partners would materialize. As a result, Congress acted to prohibit arms sales to nations that had not fulfilled their commitments and withhold payments for indirect-hire foreign nationals working at U.S. installations abroad (the Secretary of Defense may still waive this last provision). These congressional actions were meant to pressure the allies to fulfill their pledges.

Although commitment to pledges is critical, alienating countries in our efforts to collect the pledges could have severely detrimental effects in the future. This is especially true if we admit that ad hoc coalitions will be the mechanisms used to fight future regional conflicts. Collecting from our coalition partners has actually been quite successful, and the risk of offending countries with significantly different cultures may not be worth the trouble. Figure 11<sup>22</sup> indicates the degree to which pledges have been fulfilled. Failure to exercise caution in this area could serve the U.S a grave disinterest.

---

<sup>22</sup>Source: OMB Desert Shield/Desert Storm Monthly Cost Reports.



**Figure 11. Fulfillment of Pledge Commitments**

Another danger of pushing to hard for financial compensation during Operation Desert Shield/Desert Storm was that U.S. forces could be seen as mercenaries for hire. In this operation, however, it was the U.S. who initiated the action without asking for financial support in advance and without consulting many governments that were asked for support. In future coalitions, the allies should not be expected to provide substantial contributions without being given a greater role in policies governing the purposes and activities of the defense alliance. [Ref. 10]

## **V. U.S. CONTRIBUTIONS TO THE OPERATION**

Operation Desert Shield/Desert Storm represented an unprecedented situation for the U.S. in which the need for estimating costs and then accurately capturing actual costs was required. Although the Desert Shield/Desert Storm costs that were estimated and reported did not reflect all costs appropriate for burden sharing purposes, the methodologies and processes used could be a valuable base for assessing burden sharing issues in the future.

### **A. INADEQUATE GUIDANCE LEADING TO CONFUSION BETWEEN COST ESTIMATE PURPOSES**

When the Military Departments were initially requested to report the costs of Operation Desert Shield/Desert Storm, they were provided very little guidance by the Defense Department. The March 1991 Operation Desert Shield/Desert Storm Appropriations Bill required that OMB generate monthly cost reports for Congress. These reports were to include the incremental costs of the operation, separated into specific appropriations accounts. The reports were also to include the contributions made to the U.S. by each foreign country. The Omnibus Reconciliation Act of 1990 provided that:

"Emergency Desert Shield costs mean those incremental costs associated with the increase in operations in the Middle East and do not include costs that would have been

experienced by DoD as part of its normal operations absent Operation Desert Shield."

This definition of incremental costs was basically accepted to by all U.S. agencies (including DoD and OMB) and became the basis for cost estimates and cost reports. The intent was clearly one of justifying supplemental funding requirements. Although this purpose is very applicable to budgetary cost estimates, it can not be used to determine incremental costs of the operation for burden sharing discussions. As a result, the climate underlying all of the subsequent cost estimations and reports was dominated by a budgetary emphasis. The only burden sharing issues that received significant attention were those of valuing in-kind assistance and tracking allied pledges and financial contributions. These issues received attention only because they helped finance the budgetary cost of the operation. The documentation associated with the request for supplemental appropriations simply did not estimate the costs of the war.<sup>22</sup>

The difference between the incremental costs of the war, as reflected in the cost reports, and funding requirements for supplemental appropriations is important. Funding requirements represent outlays that the U.S will ultimately

---

<sup>22</sup> For an extensive discussion on the budgetary perspective of the operation, see "Cost Estimation of Operation Desert Shield/Desert Storm: A Budgetary Analysis" by Lcdr. Andrew Johnson, Naval Postgraduate School, Monterey, CA, December, 1991.

have to make. DoD and OMB reports of incremental costs included not only actual expenditures, but also included anticipated expenditures for which DoD has not actually obligated funds. Anticipated expenditures include the replacement of equipment destroyed in the war, deactivation of Ready Reserve Fleet ships, and the restocking of Maritime Prepositioning Ships (MPS). Some of these anticipated expenditures in the DoD and OMB reports may never translate into obligations because of future force reductions and the austere budget climate that DoD faces for the future. [Ref. 11]

In addition, the cost reports included the value of in-kind assistance as part of actual expenditures. Although appropriate for the full incremental costs that were included in the Congress-required cost reports, in-kind assistance is not accounted for in supplemental funding requests since the assistance is free to the U.S. and does not require any funding.

Requirements for funding do not consider DoD expenditures from an existing appropriation as an "incremental cost" of the war, even if that expense represents a serious diversion of resources from its original purpose. Equating funding requirements with incremental costs is misleading if the opportunity costs of diverted resources are greater than zero. Although the opportunity costs of diverted resources are difficult to measure precisely, they should at least be

recognized. For ease of understanding, and to be consistent with the way that Congress referred to the cost requests, this thesis will distinguish between budgetary funding requirements, referred to as "incremental costs," and incremental costs of the war for burden sharing purposes, referred to as "burden sharing incremental costs".

It is important to note that DoD provided what they called "full incremental costs" in the required monthly cost reports and provided "incremental costs" in their specific requests for supplemental funding. The major differences between the two being that the supplemental requests only included costs pertaining to that particular funding period (FY 92 Supplemental request did not include costs already covered in FY 91 Supplemental) and the value of in-kind assistance received was not added to the funding request.

Another important distinction must be made between total costs and burden sharing incremental costs. For example, under the Military Personnel (MILPERS) appropriation category, full costs of the operation would include pay and allowances for all military personnel involved in Operation Desert Shield/Desert Storm, including those already on Active Duty (AD) and those part-time Reserves called to AD. This "total" cost does not reflect the additional cost specifically attributable to the Persian Gulf. The burden sharing incremental cost would include only those military personnel

that were activated for duty specifically because of Operation Desert Shield/Desert Storm.

The debates over the differences in cost estimates and reports have not been over total costs and burden sharing incremental costs. Rather, they have centered on what was included in cost estimates and cost reports as an "incremental cost" of the war. The disparities result because of the lack of guidance as to whether a true cost of the participation in the Persian Gulf crisis was desired, or strictly a budgetary justification of requirements for supplemental funding.

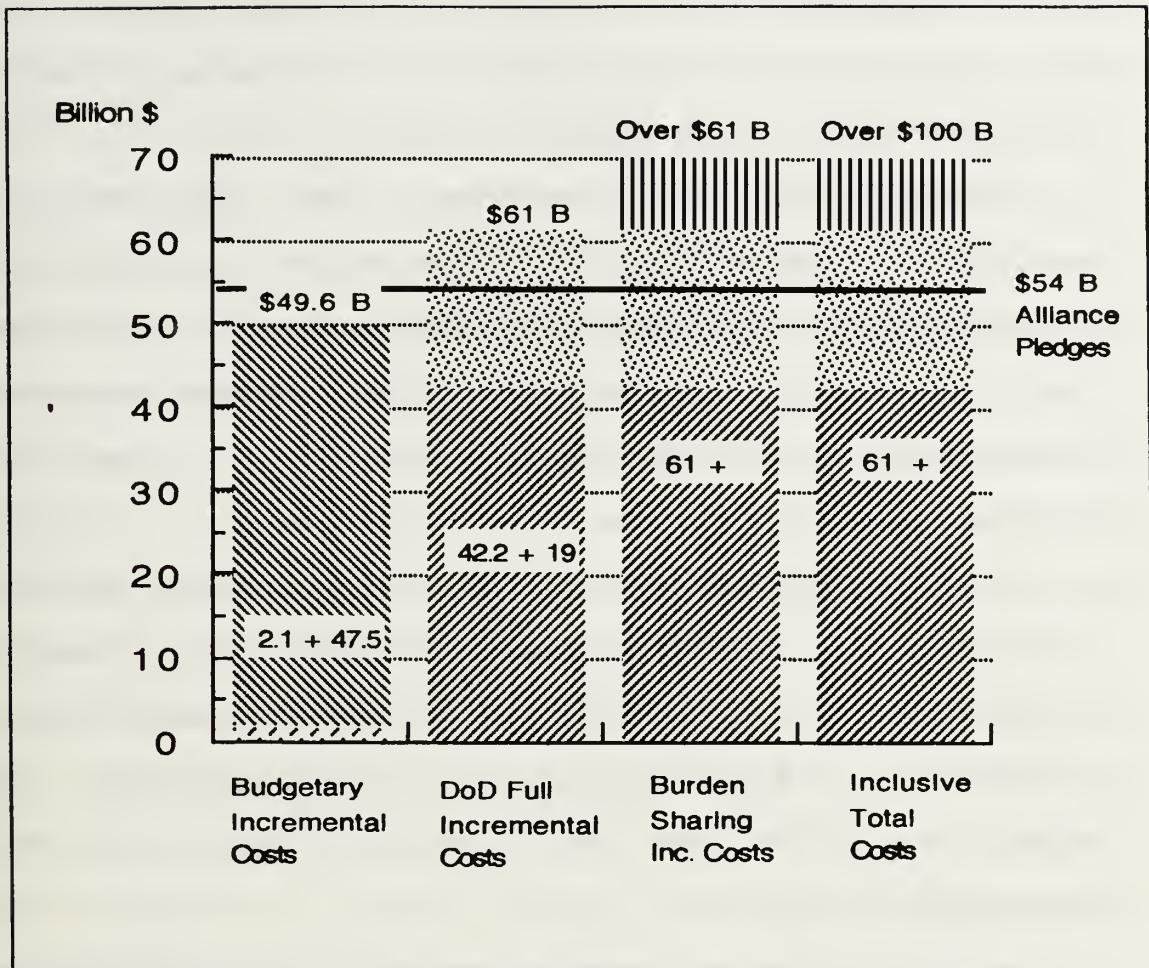
The differences in interpretations of "incremental" costs that have caused the disparate cost estimates throughout the operation can best be understood by separating U.S. costs into four separate measures (See Figure 12<sup>23</sup>):

- Total costs (roughly estimated at \$100 billion or more);
- Burden sharing incremental costs;
- Full incremental costs (roughly \$61 billion in most reports); and
- Incremental costs (supplemental funding requirements for FY 90, 91, and 92 totalling roughly \$49.6 billion).

Total costs are those costs incurred during Operation Desert Shield/Desert Storm, regardless of whether they ordinarily would have been incurred. GAO estimated these costs to exceed \$100 billion. Total costs are comprised of;

---

<sup>23</sup> Source: Conahan, Frank C., GAO Testimony before the House Budget Committee, May 15, 1991.



**Figure 12.** Clarification of Cost Categories

U.S. investment of about \$50 billion to pay, equip and otherwise maintain a force of 540,000 personnel; roughly \$10 billion in other related costs such as the forgiveness of foreign debt; and the DoD full incremental costs of the operation.

DoD full incremental costs are costs that DoD would otherwise not have incurred had it not been for the operation. OMB reported these costs to be about \$42.2 billion from August 1990 through May 1991. OMB also estimates remaining costs,

such as re-deployment, personnel costs and equipment repair will be an additional \$19 billion--bringing the full incremental cost to roughly \$61 billion.

Incremental funding requirement costs represent outlays that the U.S. has made or will ultimately be required to make. OMB reported incremental funding requirements for FY 91 and FY 92 to be \$47.5 billion. FY 90 actual requirements were an additional \$2.1 billion, bringing the total to date to \$49.6 billion.

Burden sharing incremental costs include all costs attributed to Operation Desert Shield/Desert Storm that otherwise would not have been incurred, regardless of funding requirements. In addition to DoD full incremental costs, opportunity costs and other non quantifiable costs are included. [Ref. 12]

Perhaps the most popular example that highlights the differences in the costs concerns DoD fuel costs. In its September 1990 estimate of Desert Shield incremental costs, DoD included increased fuel costs for its normal, non-Desert Shield operations as part of its cost of Operation Desert Shield. Although fuel costs of non-Desert Shield operations would seem to be inappropriate to include for emergency supplemental funding requirements, they do represent a cost directly attributable to the Persian Gulf crisis and Iraqi aggression and therefore should be counted in full incremental costs of the operation.

DoD cost estimates also assume that all equipment and munitions lost in the conflict should be replaced (although their cost reports and their supplemental requests did not). In light of the austere defense budget climate facing DoD in the future, clearly not all items will be replaced. Therefore, those that will not should be excluded from funding requirement reports. However, items destroyed do represent a cost to the U.S. of participating in the war and should be included in burden sharing incremental costs. However, these resources should be valued on the basis of their opportunity cost rather than their replacement cost.

The debate arises over what exactly to fund as replacement cost. DoD has a category in its cost reports for "major end items lost." In the case of the Navy A-6 attack aircraft, whose production line has stopped, the funding approved by Congress is not the original cost of the A-6, but the cost of a new F/A-18, determined to be an "equivalent replacement." Conversely, funding for the loss of a Navy F-14 fighter aircraft, another aircraft whose production line has been terminated, was not allowed at all in any of the Operation Desert Shield/Desert Storm supplementals. [Ref. 13] Appendix C shows which Department of the Navy aviation line items were or were not approved for the Desert Shield/Desert Storm financing mechanisms.

It seems that the confusion over what should and should not be included in the cost reports has never been resolved.

Further, the fact that such inconsistencies exist points to the conclusion that even the people making the final decisions did not realize the subtleties of the differences.

There was obviously a failure to adequately describe the ultimate purpose behind the required cost estimates and reports. This may or may not have been intentional. It is interesting to consider that sometimes it is in the requestor's best interest to intentionally omit the reason for providing the cost estimates. DoD commands that know that the estimates will be used for determining their efficiency, for example, may have a tendency to report relatively lower costs. On the other hand, if the known purpose is to determine how much others should contribute towards footing the bill, estimates may tend to be higher.

Regardless of the psychology behind the request for the reports, different interpretations of what exactly should be funded created many unnecessary disputes between government agencies. A much more encompassing interpretation is most appropriate for burden sharing purposes.

## B. DIFFICULTIES IN ESTIMATING U.S. COSTS<sup>25</sup>

Assuming that the most appropriate costs for burden sharing are more encompassing than the costs reflected in any of the current cost estimates, it is important to consider costs that should be included in a burden sharing incremental cost estimate. For the most part, the full incremental costs reported by DoD are very similar to burden sharing costs, with a few notable exceptions.

### 1. Quantifiable Costs

The cost reports reflect quantifiable, direct costs of the war. The costs are the full incremental costs of the operation as reported by DoD (including increased costs due to increased oil prices). It should be noted again that only a portion of the full incremental costs are included in the Defense supplemental appropriations. The cost reports also include quantifiable costs of phasedown of operations and the return home of deployed personnel and equipment. The direct

---

<sup>25</sup>There were several difficulties associated with developing initial cost estimates throughout the evolution of the war. Due primarily to the uncertainty as to the degree of intensity that the crisis would entail, wide disparities were seen in individual estimates. Assumptions that had to be made as a baseline for these estimates, such as projected force levels or duration of the conflict, were often completely inaccurate in hindsight. This section of the thesis focuses on detailing the difficulties behind measuring U.S. costs appropriate for burden sharing purposes, and does not concern itself with the methods used to develop cost estimates. The development of methods for cost estimation is an interesting subject best left to a separate study.

costs in the cost reports are separated into Airlift, Sealift, Personnel, Personnel Support, Operating Support, Fuel, Procurement, and Military Construction (MILCON). Refer to Appendix A.

There are two major areas to address. The first area concerns full incremental costs, as reflected in the cost reports, appropriate to include as burden sharing incremental costs, although difficult to measure. The second area consists of costs appropriate for burden sharing purposes that are not reflected in the cost reports. It is the latter area this thesis focuses on.<sup>25</sup>

The Personnel category warrants further discussion for several reasons. The unique situations in many of its subdivisions are significant for a burden sharing perspective. Although the cost reports adequately reflected the different costs incurred for Active Duty and Reserve troops, a burden sharing perspective would demand that the entire compensation should adequately reflect opportunity costs.

For Reservists, because they and their employers were aware of the inherent risk of being recalled to service, and could (should) have planned ahead for this type of eventuality, opportunity cost would equate to reserve military

---

<sup>25</sup> Discussion on incremental budgetary costs can be found in "Cost Estimation of Operation Desert Shield/Desert Storm: A Budgetary Analysis" by Lcdr. Andrew Johnson, Naval Postgraduate School, Monterey, CA, December, 1991.

pay, and not civilian pay foregone. However, opportunity cost for stop-gap forces is quite different.

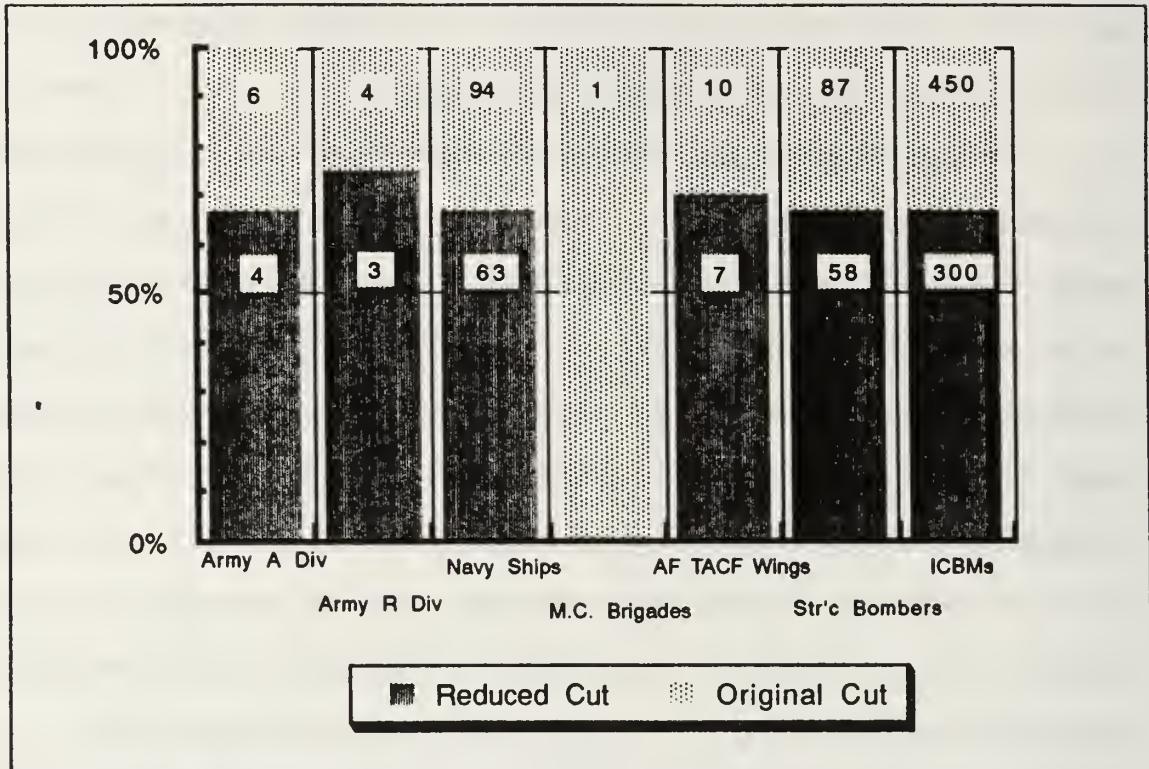
Implementation of the stop-loss policy retained personnel unexpectedly. Their opportunity cost is best measured by the salary they would have earned outside the military. The incremental burden sharing costs for these personnel are therefore greater than just the increasing costs for basic pay, subsistence, and housing allowances for retaining these troops beyond their scheduled separation date.

Another significant issue within Personnel is the potential cost increase from the scaling back of reductions in military forces that the Administration had proposed. CBO analysis shows that by 1995 annual operating costs would increase by \$10 to \$12 billion because of smaller force reductions than originally planned. [Ref. 14] Additionally, if funding for procurement of major equipment was increased because of the smaller reduction in forces, the additional costs could be substantially larger. Figure 13<sup>26</sup> shows the effects on the U.S. defense structure under original and reduced defense cuts.

If the decision to scale back force reductions was made as a direct result of Operation Desert Shield/Desert Storm, the additional costs should be included in a burden sharing incremental cost estimate.

---

<sup>26</sup> Source: Reischauer, Robert D., CBO Testimony before the House Budget Committee, February 27, 1991.



**Figure 13. Increased Costs From Smaller Force Reductions**

Additional recruitment costs due to a perception that service in the military is now a higher risk and because of the attention focused on the large economic hardships suffered by activated Reservists is also an opportunity cost attributable to the conflict. Many personnel had not anticipated the extent to which they would be called upon to shoulder the burden. The heretofore seemingly free-ride of remaining in the Reserves and collecting pay may now not be worth the risks to many personnel. On the other hand, this effect may be offset by the overwhelming success of Operation Desert Shield/Desert Storm and the resulting increase in patriotism and enhanced reputation of the military.

Finally, numerous civilians worked overtime as a result of the Gulf War. For people receiving overtime pay, this pay has been inherently agreed upon to reflect their opportunity cost. However, for people on salaries, their opportunity cost would be the value of their time.

As is especially apparent in matters of pay, measuring appropriate incremental and opportunity costs is extremely difficult. But these issues underscore the importance of accounting for these economic concepts in burden sharing cost estimates.

Procurement was another category with inadequate guidance that warrants further discussion. In addition to concerns over the replacement value of equipment, Congress also expressed concern that DoD was trying to "get well" by submitting funding requests in the supplementals that would not only replace the lost systems, but would also recoup other hidden costs and fund major improvements and upgrades as well. The most critical distinction to be made here is the difference between the budgetary cost for items that were not going to be replaced, and the opportunity cost of those items. DoD reported its full incremental cost of major end items lost in its cost reports. This did not mean that they fully expected to get all of these costs funded. In fact, OMB estimated the full incremental cost at \$61 billion, whereas their supplemental requests through FY 92 were only \$49.6 billion.[Ref. 15]

The appropriate cost measure is marginal production cost of resources used or destroyed or of their "equivalent replacements", as discussed previously. However, if the U.S. were to decide, directly as a result of Operation Desert Shield/Desert Storm, to increase our arsenal of some weapons or munitions, this would be a marginal cost attributable directly to the operation and must be included for burden sharing purposes.

There are several categories of quantifiable costs that are omitted from the monthly cost reports. Research, Development, Test and Evaluation (RDT&E) is an area of quantifiable costs not included in the monthly cost reports. RDT&E costs include items identified as priority for rapid deployment. The opportunity costs of canceling and postponing lower priority items should also be considered to determine the true cost of the process.

The costs of maintaining a presence in the Persian Gulf and restocking pre-positioned supplies that have been drawn down over the course of the war should also be determined for burden sharing incremental cost estimates. Assuming a shift in U.S. defense policy towards regional conflicts, prepositioning of equipment offers important advantages and the additional costs must be reflected when tallying the costs resulting from U.S. participation in the Persian Gulf.

Other quantifiable costs not included in the cost reports are reconstruction aid, aid to other countries, and security costs to the United States. Although aid to foreign countries is significant, as has been discussed above, the increase in U.S. expenditures on security because of terrorist threats to U.S. firms and citizens also warrants inclusion in burden sharing cost estimates. Although it is difficult to determine which acts of terrorism are directly a result of Operation Desert Shield/Desert Storm, the increased security costs should certainly be included. [Ref. 16]

## 2. Offsets

There are a number of offsets to the incremental cost of the operation that also complicate cost estimation. Some are immediate, such as canceled training exercises; others are longer term, such as purchasing equipment now rather than later. The unknown value of many of these offsets make it difficult to estimate the operation's incremental costs. [Ref. 17]

There are basically three types of offsets: Expenditures that DoD planned to make in FY 91 but canceled because of Operation Desert Shield/Desert Storm; supplies purchased during the operation that will not have to be bought later (stockpiling); and in-kind assistance that defrays the costs of the operation, as discussed above.

### **3. Non-Quantifiable Costs<sup>28</sup>**

There are several costs that the U.S. suffered directly or indirectly as a result of Operation Desert Shield/Desert Storm that cannot be quantified. For example, the U.S. spent valuable political capital all over the world to maintain the allied coalition and raise funds for support. The U.S. may have a more difficult time with trade agreements after asking Japan, Germany, and Korea for contributions to the war effort to which many of their citizens were opposed. [Ref. 18] Any deterioration of the U.S. bargaining position would result in an opportunity cost for the U.S.

Other non-quantifiable issues are: the hardships suffered by many rural U.S. communities due to the loss of doctors and health care professionals activated to the Reserves (although this should already be included as part of the opportunity cost of being in the Reserves); the lost attention of the President to other important domestic issues as a result of focusing on the war effort; the financial crisis for several U.S. industries (e.g., the U.S. airlines suffered higher fuel prices, higher insurance premiums, and fewer airline bookings); and finally, the war has made it possible for President Bush to increase his standing in public opinion polls without responding to the domestic problems of

---

<sup>28</sup> This section based heavily on "Costs of the U.S. War with Iraq", James P. Love, February 5, 1991, Public Citizen.

diminishing educational opportunities in the lack of significant increases in real wages. The opportunity cost of de-emphasis of social concerns is a cost that is not captured elsewhere.

These non-quantifiable costs may cause effects even larger than the more quantifiable costs identified above, but they are excluded from nearly all cost estimates of the war because they are so difficult to measure.

## VI. CONCLUSIONS AND RECOMMENDATIONS

### A. CONCLUSIONS

#### 1. Understanding Economic Concepts Is Critical

This thesis has accepted the challenge of applying economic concepts to real world events. Application of economic principles in the public arena is often extremely difficult. NATO, for instance, does not use the concept of marginal costs to measure a country's NATO contribution because the members decided it was impossible to determine which troops or resources were specifically attributable to NATO (e.g., U.S. troops in Germany; U.S. troops in the U.S. that are designated as NATO reinforcements; other U.S. troops, home and foreign-based, that can be re-deployed to NATO if necessary; U.S. reserves that can be recalled to assist NATO; etc.). Although economic principles are desirable, they are often difficult to apply.

Politics also complicates the application of economic principles. For example, assuming that fuel price increases resulted from our decision to intervene in Kuwait, the entire impact on DoD's fuel costs is a marginal cost of the operation. However, an issue of political fairness arises over the decision of whether or not to let DoD recapture these costs when other Federal agencies, like DoT, cannot.

Despite the difficulty with using economic concepts to explain events, a firm understanding of these principles is an absolute necessity for an intelligent discussion of burden sharing in defense alliances. Application of the economic concepts discussed in this thesis is something that decision makers should strive for in future burden sharing issues.

## **2. Measuring Equity Is Difficult**

Although concern about free riding makes measuring equity politically attractive, precise measurement of relative contributions and benefits is impossible.

### **a. Appropriate Use Of Proxies Is Imperative**

To help alleviate this problem, quantifiable proxies have historically been used to assess equity. However, the options of using various inputs and outputs opens the door to a strategic choice of proxies to manipulate data and support a desired political view. This thesis, as one of its major contributions, attempted to clarify the misconceptions of the oil security benefit, and has proposed a more appropriate proxy to use when assessing oil security benefit issues. Because of the instability of the Persian Gulf region, the oil supply security benefit will very likely be of significant interest again in the future.

### **b. Equity Formulas Are Not Necessary**

One of the most notable discoveries made during research for this thesis was the lack of any established

burden sharing methodologies to determine appropriate amounts for allied nations to pledge for financial assistance. Rough guesses seemed to be the accepted methodology for burden sharing contributions, so this thesis had no explicit methodologies to evaluate for equity reasonableness. Although the Washington Post referred to a burden sharing formula that called for Japan to provide 20% of the cost, the U.S. and other allies to provide 20%, and Kuwait and Saudi Arabia to provide 60%, supporting documentation confirming the actual existence of such a formula could not be found. [Ref. 19] In fact, an interview with an official in the OSD International Economic and Energy Affairs Office, who accompanied Secretary of State Baker on the "Tin Cup" mission to the Persian Gulf, indicated that such a formula was never used.

Failure to develop a numerically based ratio to define equitable burden sharing is no reason to despair. No one has ever developed a generally accepted measure yet. However, Operation Desert Shield/Desert Storm may have come close. Analysis of the contributions and benefits after the fact, (specifically noting the ratios of final contributions as opposed to initial pledges) shows no individual country adamantly complaining. The acquiescence of all of the coalition members may imply that an acceptable ratio was found.

### **3. Burden Sharing Incremental Costs Are More Inclusive**

The important distinction between incremental costs that reflect requests for supplemental funding and the far more inclusive burden sharing incremental costs of the operation that reflect the true cost of U.S. involvement in the operation should now be clear. Clarifying exactly which type costs are desired for reports in future coalition contingencies should be done immediately at the outset to avoid confusion like that which occurred in Operation Desert Shield/Desert Storm reporting requirements over the various interpretations of "incremental costs".

## **B. RECOMMENDATIONS**

There are several ways for the U.S. to be more prepared for burden sharing arrangements that are certain to occur with future regional conflicts and multinational coalitions.

### **1. Realize the Uniqueness of the Operation<sup>28</sup>**

The degree of international backing for all aspects of the Persian Gulf crisis was unprecedented. Burden sharing arrangements in the Persian Gulf were developed relatively easily because Saddam Hussein was the ideal enemy. International lack of trust and Hussein's historical immorality made him politically easy to join forces against.

---

<sup>28</sup> This section based heavily on "Iraq/Kuwait Crisis: The International Response and Burdensharing Issues", Gary J. Pagliano, CRS Report, August 19, 1991.

"Saddam Hussein even uses poison gas against his own people." [Ref. 20]

Arab countries with close trading relations with Iraq took domestic political risks with their cooperation, but the political costs for other countries of supporting the U.N. sanctions against Iraq were minimal. For only this reason alone, it was far easier to attain the participation of such a large number of countries in the coalition. This tremendous degree of political support from the United Nations, the Soviet Union, Arab countries, and NATO members was critical to the effectiveness of the trade embargo and Operation Desert Shield/Desert Storm.

Many countries also had additional reasons, such as common economic interests in the region, but without such an ideal political enemy, forming such an extensive, supportive coalition would have been much more difficult.

Saddam Hussein also cooperated by being an ideally incompetent military leader. The U.S. military looked perfectly prepared for its overwhelmingly successful air and ground attacks in January and February of 1991. This created the impression that the defense budget could certainly afford to be reduced. However, it must be considered, that if Hussein had continued his invasion through Kuwait into Saudi Arabia in August, the outcome could have been considerably different. It is hard to believe that the U.S. was given enough time to more than double its troop strength by the time

the first major ground confrontations began in the end of January.<sup>29</sup> More than 700,000 coalition air, ground, and naval personnel were in the theater of operations, and more than 110 coalition combatant ships were participating.[Ref. 21]

Even for the remaining nations that were still deliberating over the political and economic reasons to join the coalition, Hussein's decision to dump roughly 460 million gallons of oil into the Persian Gulf made it justifiable environmentally to join in the fight against this deplorable enemy.

Sharing the risks, roles, and responsibilities in the efforts against Iraq was almost more of a privilege than a burden. Allied pledges for contributions amount to enough to completely fund the U.S. full incremental cost of the war if the pledges are fulfilled. This capacity and willingness of other countries to share the costs of the conflict is far greater than that after any previous wars. There were little, if any, disadvantages to supporting the coalition. Clearly, these optimal conditions for establishing burden sharing arrangements are much too ideal to hope for in future regional conflicts. This remarkable international support for sharing

---

<sup>29</sup> In the first major ground confrontation, Iraq mounted a four-pronged raid across the Kuwaiti border. Near Al Wafra, U.S. and coalition forces engaged a mechanized battalion with Cobra gunships and fixed-wing aircraft. They repulsed the attack, destroying ten enemy tanks. (ALL HANDS, No. 895, 1991)

the roles, risks, and responsibilities of the collective burden is unlikely to occur again.

## 2. Stress An Equitable Process

Operation Desert Shield/Desert Storm has been another example proving that measuring disproportionality *ex post* is impossible. Therefore, the burden sharing debate should be refocused from measuring outcomes to establishing a fair process. If all coalition members would agree that a process is fair, measuring the outcome becomes unnecessary. For example,

"The firemen at a local fire station play basketball, ping pong and other games to decide who washes the dishes. Because they agree the process is fair, they don't have to track how many times each individual washes the dishes." [Ref. 22]

At present, there are no formal (or informal) agreements between the U.S. and its allies that prepare us for these operations. It is essential that the U.S. look beyond implementing a cease fire and begin negotiating more permanent security arrangements in the Persian Gulf, as well as the other regions of the world. Disproportionality should be addressed through institutional changes that alter coalition members' incentives. [Ref. 23] Establishing a model for a more equitable way to share defense burdens would be an ideal subject for a future thesis.

### **3. Remember The Lessons Learned From The Operation**

The general feeling about Operation Desert Shield/Desert Storm in July, 1991, only three months after the formal U.N. cease-fire ended the Persian Gulf War, was that the operation (and the financial hoops that had to be jumped through) was old news. Capitol Hill and the Pentagon are hectic places, and if an issue no longer warrants "front-page coverage", it is often relegated to the bottom of the pile under the newer "priorities". It was clear in July that the Pentagon, and especially Capitol Hill, had moved on to other issues. As a result, personnel had already been changed to tasks in other areas of interest and were difficult, if not impossible, to contact.

Assuming that this type of regional conflict and ad hoc coalition is so likely to face the U.S. in the future, ignoring the lessons learned from the operation would be a travesty. The U.S. should compare the various procedures and methodologies used to develop the cost estimates and cost reports for the operation against each other. Decisions should be made on the best methodologies for particular scenarios. This could significantly reduce the unnecessary duplication of effort that occurred in the initial stages of Operation Desert Shield/Desert Storm. The differences between the Army, Navy (including Marine Corps) and Air Force processes to capture incremental costs added unnecessary confusion and cost additional time. The next contingency that

the U.S. will face will doubtfully give the advantage of six months for which to prepare.

The efficient and effective parts of the process must be "put into stone" to provide a firm standardized system throughout DoD and the other federal agencies from which to progress in the future.

#### **4. Respond To The Changing Threat**

The main threat, for the first time in over forty years, is no longer the Soviet Union. Declining defense budgets indicate that the majority of Members of Congress feel that the threat, whatever that may be, is less than it was before the end of the Cold War. Whether this is true is debatable.

As we enter into the "New World Order," hot off the impressive flexing of U.S. military muscle over Iraq's forces, the U.S. must be cautious not to underestimate the need for military strength. Although the Soviet threat may be decreasing, the new threats on the horizon, as evidenced by the Iraqi invasion of Kuwait, may loom even larger (or at the least more complex and expensive). As Congressman Les Aspin stated,

"We will have to deal with regional powderkegs like the invasion of Kuwait. We will face weapons of mass destruction in the hands of international thugs who would use them. We will face adversaries who are stateless and who may be impossible to deter with the threat of retaliation. These threats we face today will profoundly shape our defense tomorrow." [Ref. 23]

If a crisis occurred somewhere in the world with much less notice than was the case with Iraq, and if the sufficient number of troops and ships were not already deployed overseas to be able to handle the problem, there would be a very significant delay before they could be made available.

The Administration's planned defense cutbacks will result in this very lack of availability. The smaller forces planned by the Administration could probably sustain the same type of deployment, but with a great deal of strain and only for a limited amount of time.

DoD is facing an austere budget climate. Although Operation Desert Shield/Desert Storm may be of some help in keeping the defense budget healthier a bit longer by possibly postponing some of the defense cuts, it seems inevitable that the budget will eventually keep declining. Operation Desert Shield/Desert Storm highlighted the weaknesses within current U.S. military capabilities to respond to the "new threat". The Administration should increase its capability to transport military weapons and supplies to crisis areas and its pre-positioning of weapons and supplies near areas of likely conflicts. With the proposed budget cuts, and the planned decrease in numbers of ships and other major end items, the U.S. must focus on increasing capability and quality to be ready for future contingencies. DoD, and the Navy in particular, will have to make major changes in its plans. Whatever may be the end result, it is clear that the focus on

what the U.S. military forces need and can afford must begin now.

## 5. Conserve Energy<sup>30</sup>

"Iraq's invasion of Kuwait marks the third time in less than twenty years that a disruption in oil supplies from the Middle East has increased inflation temporarily and pushed this country into recession." [Ref. 25]

Although some analysts believe that the Middle East may be somewhat more stable than it was before Operation Desert Shield/Desert Storm, the historical political instability in the region makes the risk of more disruptions very possible. Therefore, disruptions to the U.S. economy because of an increasing dependence on Persian Gulf oil are also very possible.

The U.S. must take advantage of any available measures (e.g., collective security agreements) in the future that will enhance the stability of the Gulf region. Although the overall oil supply security benefit was greatly overstated, and significant long run increase in oil prices is unlikely, we need to guard against short term politically motivated fluctuations, such as recently witnessed. The U.S. should take measures now to reduce its dependence on imported energy

---

<sup>30</sup> This discussion is based heavily on CBO Testimony by Richard Reischauer before the House Ways and Means Committee, March 6, 1991, and "Costs of the U.S. War with Iraq", James P. Love, Public Citizen, February 5, 1991.

products, especially from such instable areas, to increase the overall U.S. energy security.

### C. SUMMARY<sup>33</sup>

The Persian Gulf War gave the United States an unprecedented opportunity to establish methodologies and procedures to estimate costs, collect contributions, and evaluate the benefits of participation in an ad hoc coalition. The lessons learned from Operation Desert Shield/Desert Storm will provide significant insights for implementing processes for future U.S. responses to regional conflicts and burden sharing agreements.

As indicative of the future, in crises that affect numerous countries by the disturbance of world oil prices or by the formation of U.N.-sanctioned trade embargoes, a sharing of the costs is likely to occur again. As illustrated by four decades of successful deterrence on the European land mass, and now again in the Persian Gulf, the U.S. assumption of the burden of leadership will be essential to effectively organize collective efforts for a broad international response with trade, aid, finance, and military components. [Ref. 25]

With the overwhelming success of Operation Desert Shield/Desert Storm, it is absolutely crucial that the

---

<sup>33</sup> Concluding statements based on "Iraq/Kuwait Crisis: The International Response and Burden Sharing Issues", CRS Report by Gary J. Pagliano, August 19, 1991.

negotiated agreements for continued sharing of the political, economic and military costs of the operation is maintained. Not only maintained until the cease-fire details are implemented and final war-related costs are reconciled for this specific conflict, but for establishing more permanent collective security arrangements within the Gulf region.

This mandatory emphasis on burden sharing arrangements will undoubtedly be of significant value for ad hoc coalition contingencies in the future. The rapidly changing military, political, and economic conditions require the U.S. look now at more cost-effective and equitably shared changes in defense roles, risks, and responsibilities, while adjusting U.S. political goals, defense posture and economic burdens to maintain credible nuclear and conventional deterrent to the threats of the "New World Order." [Ref. 26]

**APPENDIX A**

OMB MONTHLY COST REPORT, SEPTEMBER 16, 1991



EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF MANAGEMENT AND BUDGET  
WASHINGTON, D.C. 20503

THE DIRECTOR

September 16, 1991

Honorable J. Danforth Quayle  
President of the Senate  
Washington, D.C. 20510

Dear Mr. President:

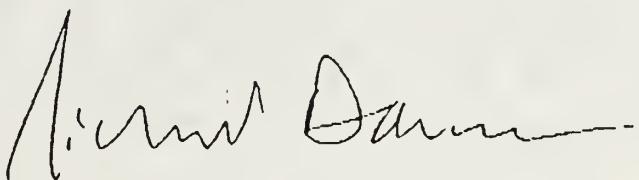
Enclosed is the seventh report on United States Costs in the Persian Gulf Conflict and Foreign Contributions to Offset Such Costs, as required by Section 401 of P.L. 102-25. This report was prepared in consultation with the Secretary of Defense, the Secretary of State, the Secretary of the Treasury, and other appropriate government officials. Previous reports have covered the costs and contributions for the period beginning August 1, 1990, and ending on June 30, 1991, for costs, and July 31, 1991, for contributions.

In accord with the legal requirement, this report provides the following information:

- o the incremental costs associated with Operation Desert Storm that were incurred during July 1991;
- o the cumulative total of such costs, by fiscal year, from August 1, 1990, to July 31, 1991;
- o the costs that are nonrecurring costs, offset by in-kind contributions, or offset by the realignment, reprogramming, or transfer of funds appropriated for activities unrelated to the Persian Gulf conflict;
- o the allocation of costs among the military departments, the Defense Agencies of the Department of Defense, and the Office of the Secretary of Defense by category -- airlift, sealift, personnel, personnel support, operating support, fuel, procurement, and military construction; and
- o the amount of contributions made to the United States by each foreign country during August 1991, as well as the cumulative total of such contributions. The report specifies the amount of cash payments pledged and received, provides a description and value of in-kind contributions pledged and received, and identifies restrictions on the use of such contributions.

The costs reported to this point should be viewed as partial and preliminary for reasons noted in the enclosure. As required by Section 401 of P.L. 102-25, an eighth report will be submitted by October 15th. In accord with the legal requirement, it will cover incremental costs associated with Operation Desert Storm that were incurred in August 1991, and foreign contributions for September 1991. Subsequent reports will be submitted by the 15th day of each month, as required, and will revise preliminary reports to reflect additional cost estimates or reestimates.

Respectfully submitted,



Richard Darman  
Director

Enclosure

**IDENTICAL LETTER SENT TO HONORABLE THOMAS S. FOLEY**

COPIES TO: HONORABLE ROBERT C. BYRD, HONORABLE MARK O. HATFIELD,  
HONORABLE JAMIE L. WHITTEN, HONORABLE JOSEPH M. MCDADE,  
HONORABLE DANIEL K. INOUYE, HONORABLE TED STEVENS,  
HONORABLE JOHN P. MURTHA, HONORABLE SAM NUNN,  
HONORABLE JOHN W. WARNER, HONORABLE LES ASPIN,  
HONORABLE WILLIAM L. DICKINSON, HONORABLE JIM SASSER,  
HONORABLE PETE V. DOMENICI, HONORABLE LEON E. PANETTA,  
AND HONORABLE WILLIS D. GRADISON, JR.

UNITED STATES COSTS IN THE PERSIAN GULF CONFLICT AND  
FOREIGN CONTRIBUTIONS TO OFFSET SUCH COSTS

Report #7: September 15, 1991

Section 401 of P.L. 102-25 requires a series of reports on incremental costs associated with Operation Desert Storm and on foreign contributions to offset such costs. This is the seventh of such reports. As required by Section 401 of P.L. 102-25, it covers costs incurred during July 1991 and contributions made during August 1991. Previous reports have covered the costs and contributions for the period beginning August 1, 1990, and ending on June 30, 1991, for costs, and July 31, 1991, for contributions.

Costs

The costs covered in this and subsequent reports are full incremental costs of Operation Desert Storm. These are additional costs resulting directly from the Persian Gulf crisis (i.e., costs that would not otherwise have been incurred). It should be noted that only a portion of full incremental costs are included in Defense supplemental appropriations. These portions are costs that require financing in fiscal year 1991 or fiscal year 1992 and that are exempt from statutory Defense budget ceilings. Not included in fiscal year 1991 or fiscal year 1992 appropriations are items of full incremental costs such as August-September 1990 costs and costs covered by in-kind contributions from allies.

Table 1 summarizes preliminary estimates of Department of Defense full incremental costs associated with Operation Desert Storm from August 1, 1990, through July 31, 1991. The cost information is shown by the cost and financing categories specified in Section 401 of P.L. 102-25. Tables 2-9 provide more detailed information by cost category. Costs shown in this report were developed by the Department of Defense and are based on the most recent data available.

Through July 1991, costs of \$45.3 billion were reported by the Department of Defense. The costs reported so far are preliminary. This report includes an estimate of costs identified to date of equipment repair, rehabilitation, and maintenance caused by the high operating rates and combat use. The report also includes some of the costs of phasedown of operations and the return home of the deployed forces.

While a substantial portion of the costs have been reported, incremental costs are being and will continue to be incurred in subsequent months. These include equipment repair, rehabilitation, and restoration that have not so far been identified, long-term benefit and disability costs, and the costs of continuing operations in the region. About 42,000 military

personnel were in the region at the end of July, and approximately 28,000 reservists were still on active duty at that time. Significant progress has been made in returning equipment from Southwest Asia; however, considerable amounts of materiel, equipment, ammunition and vehicles still had not been shipped from the area at the end of July. Materiel still in theater includes some large, heavy pieces of equipment which are costly and time consuming to prepare and transport. Combat aircraft continue to fly in the region and the U.S. forces will continue to remain in the region until all parties are satisfied with long term security arrangements. The costs through July plus the other costs not yet reported are expected by the Department of Defense to result in total incremental costs of over \$61 billion.

Incremental Coast Guard costs of \$6 million were incurred during this reporting period, with cumulative costs of \$34 million through July to support military operations in the Persian Gulf.

#### Contributions

Section 401 of P.L. 102-25 requires that this report include the amount of each country's contribution during the period covered by the report, as well as the cumulative total of such contributions. Cash and in-kind contributions pledged and received are to be specified.

Tables 10 and 11 list foreign contributions pledged in 1990 and 1991, respectively, and amounts received in August. Cash and in-kind contributions are separately specified.

As of September 11, 1991, foreign countries contributed \$8.0 billion of the \$9.7 billion pledged in calendar year 1990, and \$39.9 billion of the \$44.2 billion pledged in calendar year 1991. Of the total \$48.0 billion received, \$42.5 billion was in cash and \$5.5 billion was in-kind assistance (including food, fuel, water, building materials, transportation, and support equipment). Table 12 provides further details on in-kind contributions.

Table 13 summarizes the current status of commitments and contributions received through September 12, 1991.

## Future Reports

As required by Section 401 of P.L. 102-25, the next report will be submitted by October 15th. In accord with the legal requirement, it will cover incremental costs associated with Operation Desert Storm that were incurred in August 1991, and foreign contributions for September 1991. Subsequent reports will be submitted by the 15th day of each month, as required, and will revise preliminary reports to reflect additional costs as they are estimated or re-estimated.

## List of Tables

Table 1 - Summary, Incremental Costs Associated with Operation Desert Storm

Table 2 - Airlift, Incremental Costs Associated with Operation Desert Storm

Table 3 - Sealift, Incremental Costs Associated with Operation Desert Storm

Table 4 - Personnel, Incremental Costs Associated with Operation Desert Storm

Table 5 - Personnel Support, Incremental Costs Associated with Operation Desert Storm

Table 6 - Operating Support, Incremental Costs Associated with Operation Desert Storm

Table 7 - Fuel, Incremental Costs Associated with Operation Desert Storm

Table 8 - Procurement, Incremental Costs Associated with Operation Desert Storm

Table 9 - Military Construction, Incremental Costs Associated with Operation Desert Storm

Table 10 - Foreign Contributions Pledged in 1990 to Offset U.S. Costs

Table 11 - Foreign Contributions Pledged in 1991 to Offset U.S. Costs

Table 12 - Description of In-kind Assistance Received to Offset U.S. Costs as of August 31, 1991

Table 13 - Foreign Contributions Pledged in 1990 and 1991 to Offset U.S. Costs Commitments and Receipts through September 12, 1991

Table 1

SUMMARY 1/

## INCREMENTAL COSTS ASSOCIATED WITH OPERATION DESERT STORM

Incurred by the Department of Defense  
 From August 1, 1990 Through July 31, 1991  
 (\$ in millions)

	Preliminary Estimates					Partial and Preliminary Aug 1990 - July 1991	
	FY 1990		FY 1991		Total through July		
	Aug - Sep	Oct - June	This period July				
(1) Airlift	412	2,303	38	2,341	2,753		
(2) Sealift	235	3,474	39	3,513	3,748		
(3) Personnel	223	4,946	228	5,174	5,397		
(4) Personnel Support	352	5,340	228	5,569	5,920		
(5) Operating Support	1,210	12,268	670	12,938	14,148		
(6) Fuel	626	3,715	217	3,932	4,558		
(7) Procurement	129	8,275	43	8,318	8,447		
(8) Military Construction	11	355		355	366		
Total	3,197	40,676	1,463	42,139	45,336	2/	

Nonrecurring costs included above 3/	201	12,912	57	12,969	13,171
Costs offset by:					
In-kind contributions	225	5,113	116	5,229	5,454
Realignment 4/	913	116		116	1,029

1/ Data was compiled by OMB. Source of data -- Department of Defense. This report adjusts earlier estimates to reflect more complete accounting information.

2/ The costs reported so far are preliminary. This report includes an estimate of costs identified to date of equipment repair, rehabilitation, and maintenance caused by the high operating rates and combat use. Additional costs for these categories will be reported as more information becomes available. The report also includes some of the costs of phasedown of operations and the return home of the deployed forces. However, certain long-term benefit and disability costs have not been reflected in the estimates. Those costs will be reported in later reports. The costs through July plus the other costs not yet reported are expected by the Department of Defense to result in total incremental costs of slightly more than \$61 billion.

3/ Nonrecurring costs include investment costs associated with procurement and Military Construction, as well as other one-time costs such as the activation of the Ready Reserve Force ships.

4/ This includes the realignment, reprogramming, or transfer of funds appropriated for activities unrelated to the Persian Gulf conflict.

Table 2

AIRLIFT

## INCREMENTAL COSTS ASSOCIATED WITH OPERATION DESERT STORM

Incurred by the Department of Defense  
 From August 1, 1990 Through July 31, 1991  
 (\$ in millions)

## Preliminary Estimates

	FY 1990	FY 1991			Partial and Preliminary Aug 1990 - July 1991
	Aug - Sep	Oct - June	This period July	Total through July	
<b>Airlift</b>					
Army	207	1,062		1,062	1,268
Navy	85	709	12	721	806
Air Force	114	504	26	530	645
Intelligence Agencies		1		1	1
Special Operations Command	6	28		28	33
<b>Total</b>	<b>412</b>	<b>2,303</b>	<b>38</b>	<b>2,341</b>	<b>2,753</b>

Nonrecurring costs included above		986		986	986
Costs offset by:					
In-kind contributions	7	92	2	94	101
Realignment 1/	6				6

1/ This includes the realignment, reprogramming, or transfer of funds appropriated for activities unrelated to the Persian Gulf conflict.

This category includes costs related to the transportation by air of personnel, equipment and supplies.

The previous October-June estimate has been reduced by \$58 million due to a recategorization of certain costs to operating support.

During this period over 500 redeployment missions were flown, returning over 12,000 people and 8,000 short tons of cargo to the U.S. and Europe.

Table 3

SEALIFT

**INCREMENTAL COSTS ASSOCIATED WITH OPERATION DESERT STORM**  
**Incurred by the Department of Defense**  
**From August 1, 1990 Through July 31, 1991**  
**(*\$ in millions*)**

## Preliminary Estimates

	FY 1990	FY 1991			Partial and Preliminary Aug 1990 - July 1991
		This period	Total	through July	
	Aug - Sep	Oct - June	July		
<b>Sealift</b>					
Army	123	2,793	6	2,799	2,922
Navy	99	410	7	417	516
Air Force	12	256	25	281	293
Defense Logistics Agency		14		14	14
Special Operations Command	2	2		2	4
<b>Total</b>	<b>235</b>	<b>3,474</b>	<b>39</b>	<b>3,513</b>	<b>3,748</b>

Nonrecurring costs included above	57	1,100	2	1,102	1,159
<b>Costs offset by:</b>					
In-kind contributions	2	138	4	142	144
Realignment 1/	2				2

1/ This includes the realignment, reprogramming, or transfer of funds appropriated for activities unrelated to the Persian Gulf conflict.

This category includes costs related to the transportation by sea of personnel, equipment and supplies.

During this period a total of 57 ships (22 of them foreign flag ships) made redeployment deliveries. These vessels shipped over 350,000 short tons of dry cargo back to the U.S. and Europe.

Table 4

PERSONNEL

## INCREMENTAL COSTS ASSOCIATED WITH OPERATION DESERT STORM

Incurred by the Department of Defense  
 From August 1, 1990 Through July 31, 1991

(\$ in millions)

## Preliminary Estimates

	FY 1990		FY 1991		Partial and Preliminary Aug 1990 - July 1991
	Aug - Sep	Oct - June	This period July	Total through July	
Personnel					
Army	126	2,993	115	3,108	3,233
Navy	22	1,082	54	1,136	1,158
Air Force	75	871	59	930	1,005
Total	223	4,946	228	5,174	5,397
Nonrecurring costs included above			45	45	45
Costs offset by:					
In-kind contributions					
Realignment 1/	15				15

1/ This includes the realignment, reprogramming, or transfer of funds appropriated for activities unrelated to the Persian Gulf conflict.

This category includes pay and allowances of members of the reserve components of the Armed Forces called or ordered to active duty and the increased pay and allowances of members of the regular components of the Armed Forces incurred because of deployment in connection with Operation Desert Storm.

The previous October-June estimate has been reduced by \$102 million due to a recalculation of Air Force reserve costs.

At the end of July about 28,000 Reservists were still on active duty and about 42,000 people were still in theater.

Table 5  
PERSONNEL SUPPORT

INCREMENTAL COSTS ASSOCIATED WITH OPERATION DESERT STORM  
Incurred by the Department of Defense  
From August 1, 1990 Through July 31, 1991  
(\$ in millions)

Preliminary Estimates

	FY 1990		FY 1991			Partial and Preliminary Aug 1990 - July 1991
	Aug - Sep	Oct - June	This period	July	Total through July	
<u>Personnel Support</u>						
Army	209	4,055	33		4,088	4,297
Navy	104	849	59		908	1,013
Air Force	24	389	134		523	546
Intelligence Agencies	2	9	0 1/		10	12
Defense Logistics Agency	12	16	1		16	28
Defense Mapping Agency		5	1		6	6
Special Operations Command	2	8	0 1/		8	9
Office of the Secretary of Defense		9	1		10	10
<b>Total</b>	<b>352</b>	<b>5,340</b>	<b>228</b>		<b>5,569</b>	<b>5,920</b>

Nonrecurring costs included above	4	1,230	12	1,242	1,246
Costs offset by:					
In-kind contributions	28	1,615	19	1,634	1,661
Realignment 2/	3				3

1/ Costs are less than \$500 thousand.

2/ This includes the realignment, reprogramming, or transfer of funds appropriated for activities unrelated to the Persian Gulf conflict.

This category includes subsistence, uniforms and medical costs.

In July major costs were for medical care and other personnel support.

Table 6

OPERATING SUPPORT

## INCREMENTAL COSTS ASSOCIATED WITH OPERATION DESERT STORM

Incurred by the Department of Defense  
 From August 1, 1990 Through July 31, 1991  
 (\$ in millions)

## Preliminary Estimates

	FY 1990	FY 1991		Partial and Preliminary Aug 1990 - July 1991
	Aug - Sep	Oct - June	This period July	Total through July
<b>Operating Support</b>				
Army	896	6,909	558	7,467
Navy	223	3,131	21	3,152
Air Force	68	2,144	83	2,227
Intelligence Agencies		1	0 1/	1
Special Operations Command	15	29	7	35
Defense Communications Agency		1		1
Defense Mapping Agency	8	48	1	49
Defense Nuclear Agency		2	0 1/	2
Office of the Secretary of Defense		3		3
<b>Total</b>	<b>1,210</b>	<b>12,268</b>	<b>670</b>	<b>12,938</b>
				<b>14,148</b>

Nonrecurring costs included above		922		922	922
Costs offset by:					
In-kind contributions	167	1,631	45	1,676	1,843
Realignment 2/	698	69		69	767

1/ Costs are less than \$500 thousand.

2/ This includes the realignment, reprogramming, or transfer of funds appropriated for activities unrelated to the Persian Gulf conflict.

This category includes equipment support costs, costs associated with increased operational tempo, spare parts, stock fund purchases, communications, and equipment maintenance.

The previous October-June estimate has been increased by \$143 million. This increase is for higher in-country operation costs.

Costs reported during this period were primarily for in-country operating costs.

Table 7

FUEL

INCREMENTAL COSTS ASSOCIATED WITH OPERATION DESERT STORM  
 Incurred by the Department of Defense  
 From August 1, 1990 Through July 31, 1991  
 (\$ in millions)

Preliminary Estimates

Fuel	FY 1990		FY 1991		Partial and Preliminary Aug 1990 - July 1991
	Aug - Sep	Oct - June	This period	Total	
			July	through July	
Army	10	148	16	164	174
Navy	19	1,134	98	1,232	1,251
Air Force	137	2,422	102	2,524	2,661
Special Operations Command		10	1	12	12
Defense Logistics Agency	460				460
<b>Total</b>	<b>626</b>	<b>3,715</b>	<b>217</b>	<b>3,932</b>	<b>4,558</b>

Nonrecurring costs included above					
Costs offset by:					
In-kind contributions	21	1,176	46	1,222	1,243
Realignment 1/	60				60

1/ This includes the realignment, reprogramming, or transfer of funds appropriated for activities unrelated to the Persian Gulf conflict.

This category includes the additional fuel required for higher operating tempo and for airlift and sealift transportation of personnel and equipment as well as for the higher prices for fuel during the period.

The previous October-June estimate has been decreased by \$212 million to reflect a credit for fuel which had been charged to Navy but which had in fact been provided as assistance-in-kind.

About 75 percent of the costs reported during this period were due to higher prices for fuel with the balance due to the higher operating tempo.

Table 8

PROCUREMENT

## INCREMENTAL COSTS ASSOCIATED WITH OPERATION DESERT STORM

Incurred by the Department of Defense  
From August 1, 1990 Through July 31, 1991

(\$ in millions)

## Preliminary Estimates

	FY 1990		FY 1991		Partial and Preliminary Aug 1990 - July 1991
	Aug - Sep	Oct - June	This period July	Total through July	
<u>Procurement</u>					
Army	49	2,351	42	2,393	2,442
Navy	47	2,415		2,415	2,462
Air Force	32	3,372		3,372	3,404
Intelligence Agencies	1	12	1	13	13
Defense Communications Agency		0 1/		0	0 1/
Special Operations Command		99		99	99
Defense Logistics Agency		4		4	4
Defense Mapping Agency		1		1	1
Defense Nuclear Agency		0 1/		0	0 1/
Defense Systems Project Office		1		1	1
Office of the Secretary of Defense		21		21	21
Total	129	8,275	43 1/	8,318	8,447

Nonrecurring costs included above	129	8,275	43 1/	8,318	8,447
Costs offset by:					
In-kind contributions		124		124	124
Realignment 2/	119	47		47	165

1/ Costs are less than \$500 thousand.

2/ This includes the realignment, reprogramming, or transfer of funds appropriated for activities unrelated to the Persian Gulf conflict.

This category includes ammunition, weapon systems improvements and upgrades, and equipment purchases.

The previous October - June estimates have been decreased by \$21 million to reflect reestimates of equipment provided as assistance-in-kind.

The costs for July result primarily from the loss of Army combat vehicles during a fire at Doha, Kuwait on July 17th and finalization of Army contracts for purchase of special purpose equipment to facilitate operations in Southwest Asia.

Table 9

MILITARY CONSTRUCTION

## INCREMENTAL COSTS ASSOCIATED WITH OPERATION DESERT STORM

Incurred by the Department of Defense  
From August 1, 1990 Through July 31, 1991

(\$ in millions)

## Preliminary Estimates

	FY 1990	FY 1991		Partial and Preliminary Aug 1990 – July 1991
	Aug - Sep	Oct - June	This period July	
<u>Military Construction</u>				
Army	7	353		360
Navy				
Air Force	4	2		5
<b>Total</b>	<b>11</b>	<b>355</b>		<b>366</b>
Nonrecurring costs included above	11	355	355	366
Costs offset by:				
In-kind contributions		338	338	338
Realignment 1/	11			11

1/ This includes the realignment, reprogramming, or transfer of funds appropriated for activities unrelated to the Persian Gulf conflict.

This category includes the cost of constructing temporary billets for troops, and administrative and supply and maintenance facilities.

There was a decrease in the previously reported Army October-June costs due to a recestimate by CENTCOM of the value of assistance-in-kind contributions. There were no new costs reported in this category.

Table 10

**FOREIGN CONTRIBUTIONS PLEDGED IN 1990 TO OFFSET U.S. COSTS 1/  
(\$ in millions)**

	Commitments			Receipts in August			Receipts through September 12, 1991			Future Receipts
	Cash	In-kind	Total	Cash	In-kind	Total	Cash	In-kind	Total	
GCC STATES	5,844	1,001	6,845				4,256	1,001	5,257	1,588
SAUDI ARABIA	2,474	865	3,339				886	865	1,751	1,588
KUWAIT	2,500	6	2,506				2,500	6	2,506	
UAE	870	130	1,000				870	130	1,000	
GERMANY 3/	272	800	1,072				272	782	1,054	18 4/
JAPAN 3/	1,084	656	1,740	39		39	1,084	571	1,655	85 5/
KOREA	50	30	80				50	30	80	
BAHRAIN		1	1					1	1	
OMAN/QATAR		1	1					1	1	
DENMARK		1	1					1	1	
<b>TOTAL</b>	<b>7,250</b>	<b>2,490</b>	<b>9,740</b>	<b>39</b>		<b>39</b>	<b>5,662</b>	<b>2,387</b>	<b>8,049</b>	<b>1,691</b>

1/ Data was compiled by OMB. Sources of data: commitments -- Defense, State, and Treasury; cash received -- Treasury; receipts and value of in-kind assistance -- Defense.

2/ This is reimbursement for enroute transportation through December for the second deployment and for U.S. in-theater expenses for food, building materials, fuel, and support. Bills for reimbursement have been forwarded to Saudi Arabia.

3/ 1990 cash contributions were for transportation and associated costs.

4/ An accounting of in-kind assistance accepted by U.S. forces is under way. It is expected that this accounting will conclude that the German commitment has been fully met.

5/ Resolution of balance is under discussion and should be resolved shortly.

Table 11

FOREIGN CONTRIBUTIONS PLEDGED IN 1991 TO OFFSET U.S. COSTS 1/  
(\$ in millions)

	Commitments 2/			Receipts in August			Receipts through September 12, 1991			Future Receipts	
				Cash	In-kind	Total	Cash	In-kind	Total		
	GCC STATES	SAUDI ARABIA	KUWAIT	UAE	GERMANY	JAPAN 3/	KOREA	DENMARK	LUXEMBOURG	OTHER	
GCC STATES	27,017	3,071	30,088		1,215	57	1,272	22,856	3,071	25,927	4,161
SAUDI ARABIA	10,546	2,954	13,500		515	55	570	9,166	2,954	12,120	1,380
KUWAIT	13,471	30	13,500		700	2	702	10,690	30	10,720	2,781
UAE	3,000	88	3,088					3,000	88	3,088	
GERMANY	5,500		5,500					5,500		5,500	
JAPAN 3/	8,332		8,332					8,332		8,332	
KOREA	100	175	275				3	3	100	41	141
DENMARK		11	11				5	5		11	11
LUXEMBOURG		6	6						6	6	
OTHER	4	2	6						4	2	6
<b>TOTAL</b>	<b>40,952</b>	<b>3,265</b>	<b>44,218</b>		<b>1,215</b>	<b>65</b>	<b>1,280</b>	<b>36,792</b>	<b>3,132</b>	<b>39,924</b>	<b>4,294</b>

1/ Data was compiled by OMB. Sources of data: commitments -- Defense, State, and Treasury; cash received -- Treasury; receipts and value of in-kind assistance -- Defense.

2/ 1991 commitments in most instances did not distinguish between cash and in-kind. The commitment shown above reflects actual in-kind assistance received unless specific information is available.

3/ 1991 cash contributions are for logistics and related support.

Table 12  
 DESCRIPTION OF IN-KIND ASSISTANCE RECEIVED  
 TO OFFSET U.S. COSTS AS OF AUGUST 31, 1991  
 (\$ in millions)

	Calendar Year 1990	Calendar Year 1991
SAUDI ARABIA .....	865	2,954
Host nation support including food, fuel, housing, building materials, transportation and port handling services.		
KUWAIT .....	6	30
Transportation		
UNITED ARAB EMIRATES .....	130	88
Fuel, food and water, security services, construction equipment and civilian labor.		
GERMANY .....	782	
Vehicles including cargo trucks, water trailers, buses and ambulances; generators; radios; portable showers; protective masks, and chemical sensing vehicles		
JAPAN .....	571	
Construction and engineering support, vehicles, electronic data processing, telephone services, medical equipment, and transportation.		
KOREA .....	30	41
Transportation and replenishment stocks		
BAHRAIN .....	1	
Medical supplies, food and water		
OMAN/QATAR .....	1	
Oil, telephones, food and water		
DENMARK .....	1	11
Transportation		
LUXEMBOURG.....		6
Transportation		
OTHER .....		2
Transportation		
<b>TOTAL</b>	<b>2,387</b>	<b>3,132</b>

Table 13

FOREIGN CONTRIBUTIONS PLEDGED IN 1990 AND 1991 TO OFFSET U.S. COSTS  
 COMMITMENTS AND RECEIPTS THROUGH SEPTEMBER 12, 1991 1/  
 (\$ in millions)

	Commitments			Receipts 2/			Future Receipts
	1990	1991	Total	Cash	In-kind	Total	
GCC STATES	6,845	30,088	36,933	27,112	4,073	31,185	5,748
SAUDI ARABIA	3,339	13,500	16,839	10,052	3,819	13,871	2,968
KUWAIT	2,506	13,500	16,006	13,190	36	13,226	2,781
UAE	1,000	3,088	4,088	3,870	218	4,088	
GERMANY	1,072	5,500	6,572	5,772	782	6,554	18 3/
JAPAN	1,740	8,332	10,072	9,416	571	9,987	85 4/
KOREA	80	275	355	150	71	221	134
OTHER	3	23	26	4	22	26	
<b>TOTAL</b>	<b>9,740</b>	<b>44,218</b>	<b>53,958</b>	<b>42,454</b>	<b>5,519</b>	<b>47,973</b>	<b>6,985</b>

- 1/ Data was compiled by OMB. Sources of data: commitments -- Defense, State, and Treasury; cash received -- Treasury; receipts and value of in-kind assistance -- Defense.
- 2/ Cash receipts are as of September 12, 1991. In-kind assistance is as of August 31, 1991.
- 3/ An accounting of in-kind assistance accepted by U.S. forces is under way. It is expected that this accounting will conclude that the German commitment has been fully met.
- 4/ Resolution of balance is under discussion and should be resolved shortly.

## APPENDIX B

### 1. Description of In-Kind Assistance by Country (\$ in millions, as of January 31, 1991)

Saudi Arabia: (Host nation support including food, fuel, housing, building materials, transportation and port handling services.)	\$1,566
Germany: (Vehicles including cargo trucks, water trailers, buses and ambulances; generators, radios, portable showers and protective masks.)	531
Japan: (Construction and engineering support, vehicles, electronic data processing, telephone services, and medical equipment.)	457
United Arab Emirates: (Fuel, food and water, security services, construction equipment and civilian labor)	140
Korea: (Transportation)	21
Kuwait: (Transportation)	10
Other: (Water, medical services, and transportation.)	3
TOTAL	<b>\$2,728</b>

### 2. Description of In-Kind Assistance by Type of Service or Product (\$ in millions, as of January 31, 1991)

Fuel	\$836
Food / potable water	641
Vehicles	354
Construction	275
Equipment, facilities and services	214
Transportation	59
Electronic data processing	23
Warehouse facilities	28
Housing and utilities	59
Telephone and communication services	40
Utilities	13
Other (medical, airport services, security services; civilian labor, laundry, morale and welfare, and furniture)	186
TOTAL	<b>\$2,728</b>

## Appendix C

### Desert Shield/Storm Financing Cost of Combat (\$ in million)

	P-1 Line Item	Combat Costs	D Storm I, Xfer 1	D Storm I, Xfer 2	D Storm II, Suppl.	Not Financed
1	A-6 (repl w/F/A-18)	108.0			108.0	
2	AV-8	230.0			230.0	
3	F-14	55.0				55.0
4	F/A-18	135.0			135.0	
5	OV-10	13.0				13.0
6	AH-1	18.0			18.0	
7	UH-1	8.0				8.0
8	CH-46	21.0				21.0
9	SH-60	17.0			17.0	
10	SH-60B/FLIR	9.4		9.4		
11	F/A-18/Camera mounting kit	0.1		0.1		
12	F/A-18/AWW-9A mods	1.7		1.7		
13	H-1 mods	2.2		2.2		
14	EA-6B mods/ARC-164 install kit	0.2		0.2		
15	S-3 mods/ARC-162 radio	0.3		0.3		
16	FEWSG/ALQ-167 mods	1.8		1.8		
17	KC-130 mods/electronic c'measures	11.5		11.5		
19	Common Avionics/DALS kits	1.7		1.7		
19	Common Avionics/GPS receivers	2.4		2.4		
20	P-3 mods/survivability mods	7.7		7.7		
21	H-3 mods/troop seats	0.2		0.2		
22	H-3 mods/night vision goggles	0.3		0.3		
23	H-3 mods/ALQ-126A	0.9		0.9		
24	EP-3 mods/sinal exploitation mods	0.3		0.3		
25	Spares/C-130 engines	16.0	18.0			
26	Initial spares	32.6		32.6		
27	Replenishment spares	36.5	•	36.5		
28	CPC/aerial cameras	3.4		3.4		
29	CGE/M1022 dolly sets	1.3		1.3		
30	CGE-MEP-0064 generators	0.2		0.2		
31	CGE/MPEAMS	9.4		9.4		
32	CGE/TOPSCENE	1.4		1.4		
33	CGE/spotting dollys	0.7		0.7		
34	CGE/canopy covers	0.1		0.1		
35	Magic Lantern		9.2			-9.2
36	Total	747.3	25.2	126.3	508.0	87.8

## LIST OF REFERENCES

1. Gates, William R. and Katsuaki L.Terasawa, "Commitment, Threat Perceptions and Expenditures in a Defense Alliance", International Studies Quarterly, 1992, p. 22.
2. Gates and Terasawa, "Burden Sharing in the Persian Gulf: Lessons Learned and Implications for the Future", Naval Postgraduate School, Monterey, CA, 1992, p. 32.
3. Conahan, Frank C., GAO Testimony before the House Ways and Means Committee, July 31, 1991, p. 2.
4. Shue, Robert, "Sharing of Responsibility for the Coalition Effort in the Persian Gulf", Office of the DoD Comptroller Report, January 11, 1991, p. 1.
5. Conahan, July 31, 1991, p. 8.
6. Conahan, Frank C., GAO Testimony before the House Budget Committee, May 15, 1991, p. 8.
7. Love, James P., "Costs of the U.S. War with Iraq", Public Citizen, February 5, 1991, pp. 15-16.
8. Conahan, May 15, 1991, p. 10.
9. Daggett, Stephen and Gary J. Pagliano, "Persian Gulf War: U.S. Costs and Allied Financial Contributions", CRS Issue Brief, July 19, 1991, p. 9.
10. Pagliano, Gary J., "Iraq/Kuwait Crisis: The International Response And Burdensharing Issues", CRS Report, June 26, 1991, p. 13.
11. Conahan, May 15, 1991, pp. 4-6.
12. Conahan, July 31, 1991, pp. 11-12.
13. Interview with Bob Green, NAVCOMPT Procurement Division, July 25, 1991.
14. Reischauer, Robert D., CBO Testimony before the House Budget Committee, February 27, 1991, p. 24.
15. Conahan, July 31, 1991, p. 11.

16. Love, p. 18.
17. Bowsher, Charles A., GAO Testimony before the House Budget Committee, January 4, 1991, pp. 10-13.
18. Love, p. 39.
19. Daggett and Pagliano, p. 10.
20. Adelman, Kenneth L. and Norman R. Augustine, The Defense Revolution, Institute for Contemporary Studies, San Francisco, CA, 1990, p. 10.
21. ALL HANDS, Special Issue, No. 895, "Shield/Storm Chronology", p. 65.
22. Gates and Terasawa, "Burden Sharing in the Persian Gulf: Lessons Learned and Implications for the Future", p. 33.
23. Gates and Terasawa, "Commitment, Threat Perceptions and Expenditures in a Defense Alliance", p. 22.
24. Aspin, Les, Chairman of the House Armed Services Committee, Official Statement, September 19, 1990, p. 2.
25. Reischauer, Robert D., CBO Testimony before the House Ways and Means Committee, March 6, 1991, p. 19.
26. Pagliano, p. 1.
27. Report on Allied Contributions to the Common Defense, Office of the Secretary of Defense, May, 1991, Appendix B, p. 9.

**INITIAL DISTRIBUTION LIST**

1. Defense Technical Information Center Cameron Station Alexandria, Virginia 22304-6145	2
2. Library, Code 0142 Naval Postgraduate School Monterey, California 93943-5002	2

a













DUDLEY KNOX LIBRARY  
NAVAL POSTGRADUATE SCHOOL  
MONTEREY CA 93943-5101



GAYLORD S



DUDLEY KNOX LIBRARY



3 2768 00019270 2